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A model for programming forage supplies

Craig L. Dobbins
Iowa State University

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by

Craig Lee Dobbins

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INTRODUCTION

The beef cow herd has been a part of Iowa's agriculture since its inception. However, in recent years Iowa's beef cow numbers have shown a dramatic increase. Dr. S. A. Ewing has estimated that 46 to 50 million beef cows will be needed by 1980 (39 million presently) to provide enough beef for 243 million people, thus Iowa's beef cow numbers could also be expected to increase. (1)

When one considers beef cows on Iowa farms he must also think about forage needs. Dr. W. F. Wedin, Iowa State University agronomist, has estimated that even in an unimproved state Iowa now produces enough hay and pasture to support 1½ million beef cows. If these acres were developed to their full potential it is estimated Iowa could support about seven million head. With sharper management and better use of the present mix of unimproved and improved grassland it is estimated that Iowa's beef cow numbers could be doubled. Thus Iowa has the physical potential to expand beef raising.

Since feed costs make up approximately two-thirds of the annual costs of keeping a beef cow, the economically efficient production and utilization of forage is a primary concern of the individual cow-calf producer. It is this problem that will be addressed in this study.

Background Information

Over a 20 year period from 1953 to 1972, beef cow numbers in the United States have increased from 23.29 million head on January 1, 1953, to 38.73 million head on January 1, 1972, a 65.87 percent increase. (26) (27)

As illustrated in Table 1 the primary increase in U.S. beef cow numbers has come about since 1962. Of the 65.87 percent increase in the U.S. beef cow numbers in this 20 year period, 44.66 percent of the increase has taken place since 1962. Although beef cow numbers in Iowa have followed the same general trends as for the U.S., the expansion in cow numbers since 1962 has been greater than the U.S. increase.

In comparing Iowa's increase in beef cow numbers from 1962 to 1972 with the other top ranking states in beef calf production for 1972; respectfully: Texas, Oklahoma, Missouri, Nebraska, Kansas, South Dakota, Iowa, Montana, Mississippi, Colorado, only the State of Missouri had a larger percentage increase.

The increased beef cow production in Iowa has caused a larger proportion of the U.S. beef calf production to be located in Iowa, thus indicating distributional changes in beef production. Although these geographical shifts have been slight in most cases, of the ten largest beef cow producing states in 1972 named previously, only Missouri, Kansas, Iowa and Mississippi have not seen a decrease in their proportion of the U.S. total. (26) (27)

Table 2 shows how the change in Iowa's beef cow numbers since 1962 compares with changes in other agricultural production in the state. With

the exception of soybeans the percentage increase in beef cow numbers since 1962 has been larger than the percentage increase in any other major agricultural production enterprises in the state.

Table 1. The changes in beef cow production for the United States and Iowa for the years of 1953 through 1972[a]

Year	Total Beef Cows in US[b] (Mil. Hd.)	Percent of 1953 Total	Total Beef Cows in Iowa (Mil. Hd.)	Percent of 1953 Total	Iowa's Percentage of US Total
1953	23.29	100.00	.87	100.00	3.74
1954	25.05	107.56	.99	113.79	3.95
1955	25.66	110.18	1.02	117.24	3.98
1956	25.76	110.61	.99	113.79	3.84
1957	24.94	107.08	.94	108.05	3.77
1958	24.43	104.89	.90	103.45	3.68
1959	25.58	109.83	.95	108.20	3.71
1960	26.34	113.10	.99	113.79	3.76
1961	17.03	116.06	1.00	114.94	3.70
1962	28.23	121.21	1.03	118.39	3.65
1963	29.89	128.34	1.08	124.14	3.61
1964	31.73	136.24	1.16	113.33	3.66
1965	32.70	140.40	1.25	143.68	3.82
1966	34.34	147.45	1.30	149.43	3.79
1967	34.60	148.56	1.33	152.87	3.84
1968	35.31	151.61	1.35	155.17	3.82
1969	36.13	155.13	1.39	159.77	3.85
1970	37.33	160.28	1.44	165.52	3.86
1971	37.44	160.76	1.52	174.71	4.06
1972	38.63	165.87	1.74	200.00	4.50

[a]Sources: Livestock and Poultry, Inventory, January 1 (26). Cattle, Sheep, and Goat Inventory, January 1 (27).

[b]The beef cow numbers for the years 1959 through 1972 represent only those beef cows in the 48 continent states.

Table 2. Total state production for selected agricultural enterprises in 1962 and 1972[a]

Production Enterprise	Number in 1962	Number in 1972[b]	% of 1962 Number
Beef Cows (head)	929,377	1,439,104	154.85
Sows Farrowed (head)	2,564,831	2,375,561	92.62
Dairy Cows (head)	733,435	416,834	56.83
Grain Fed Cattle Marketed (head)	3,055,304	3,735,952	122.78
Corn for Grain (acres)	9,706,692	10,650,084	109.72
Soybeans (acres)	3,364,808	5,964,253	177.25
Oats (acres)	2,923,397	1,181,747	40.42
Hay (acres)	3,506,965	2,279,705	65.01
Pasture (acres)	8,143,313	6,735,239	82.72

[a]Sources: Iowa Annual Farm Census 1962 (8) and Iowa Annual Farm Census 1972 (Preliminary) (9).

[b]Preliminary Results.

Table 3 indicates that each crop reporting district in Iowa followed the same trends in beef raising, dairy production, cattle feeding, hay and pasture production as the state totals, i.e. dairy cattle, hay and pasture production decreased while beef cows and market cattle increased. However, even with reduced acreages in 1972, hay and pasture production still totaled 9.02 million acres. This is 26.76 percent of the 33.71 million acres in Iowa farms. Pasture alone constitutes 19.94 percent of Iowa farmland.

Distributional changes in beef calf production within the state are also shown in Table 3. In 1962 the five largest beef raising districts were respectively: South Central, East Central, Central, West Central and Southwest. These five districts accounted for 624 thousand head or 67.17 percent of the state total. In 1972 the five largest producing districts

were respectively: South Central, West Central, East Central, Southwest and Southeast. These top five districts are now producing 977 thousand head or 67.88 percent of the state total.

Table 3. Production levels in each of Iowa's crop reporting districts for selected agricultural enterprises in 1962 and 1972 (numbers in thousands)[a]

District	Beef Cows		Dairy Cows		Grain Fed Cattle Mktd.		Hay		Pasture	
	1962	1972[b]	1962	1972[b]	1962	1972[b]	1962	1972[b]	1962	1972[b]
Northwest	62	108	77	47	693	945	328	170	517	392
North Central	58	65	82	35	287	258	331	128	415	283
Northeast	80	142	244	191	140	200	546	462	1135	930
West Central	113	195	62	24	561	774	399	207	882	719
Central	117	147	60	22	394	446	413	189	763	603
East Central	122	177	92	55	421	443	413	280	1001	794
Southwest	111	172	32	11	354	414	320	214	828	697
South Central	161	274	43	16	69	89	428	377	1502	1406
Southeast	104	159	42	16	137	166	329	250	1101	912
State Total	929	1439	733	417	3055	3736	3507	2280	8143	6735

[a]Sources: Iowa Annual Farm Census 1962 (8) and Iowa Annual Farm Census 1972 (Preliminary) (9).

[b]Preliminary Results.

The ranking of the crop reporting districts shows that beef cow production has become concentrated in the border areas of Iowa. This is not a totally unexpected trend because it is this area of the state that contains an abundance of grazing land. The five leading beef raising districts account for 67.23 percent of the state's total pasture land and 58.25 percent of the state's hay production.

Statement of the Problem

Because beef cows are important utilizers of the hay and pasture produced on individual farms, the questions that follow are deserving of study. What is the best mix of grain and forage crops to raise? What forage variety should be grown and how should it be utilized? How many acres of each should be grown? What fertilizer level should be applied to cool season grasses? If pastured what type of grazing management is most efficient? How can crop residues best be used to supplement other forages? How many beef cows can be supported on an individual farm with given land and labor resources?

The problem of forage planning is indeed complex. Its complexity stems primarily from one source, the time dimension of forage production and utilization. Seasonal production patterns, as illustrated in Table 4, vary so much from one forage to another that total forage production is not a useful criterion to use in evaluating forages and in planning forage systems.

The problem of blending forages and management systems to provide an adequate forage supply has prompted a great deal of research in grassland production and utilization. Several guidelines for forage planning have emerged from this research:

1. Since the forage production pattern typically does not fit the animals' needs, planning should be based on a 12-month period. This method helps prevent the heavy stocking of pasture to utilize spring growth with resultant severe shortages during the summer and fall. When

planning a forage system the producer must consider harvested forage as well as grazed forage.

Table 4. Estimated availability of forage for grazing expressed as the percentage available per month[a]

Type of Pasture	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Kentucky bluegrass - white clover, unimproved	25	30	10	5	15	10	5	
Kentucky bluegrass - white clover + nitrogen, phosphorus	35	35	8	5	10	4	3	
Renovated (continuous grazing)								
Birdsfoot trefoil - grass	10	25	25	20	10[b]	5[b]	5	
Birdsfoot trefoil - grass deferred for midsummer grazing		15	35	25	15[b]	5[b]	5	
Tall - grasses + nitrogen[c]	30	30	10	5	10	10	5	
Tall - grasses + nitrogen, deferred for fall grazing[c]	30	30				25	15	
Supplemental								
Sudangrass or sorghum - sudan hybrids			40	40	15		5	
Sudangrass or sorghum - sudan hybrids, deferred for fall and winter grazing					30		45	25

[a]Source: Schaller (23).

[b]Allowances have been made for winter hurding of legume from September 15 to October 15.

[c]Bromegrass, Orchardgrass, Tall Fescue, Reed Canarygrass or combinations.

2. Once the forage needs have been recognized the next step is to meet these needs. This involves the selection of forage species. In selecting a species it is necessary to take into account such factors as average rainfall, soil drainage, erosion hazard, soil pH level, nutrient supply, use of the stand and length of time it is to be in production.

3. If one species is exceptionally well adapted to a given location any mixture is likely to be lower yielding. While few mixtures will outyield well-adapted grasses that are heavily fertilized with nitrogen, the quality of the forage can often be improved by including a legume. Thus the problem becomes one of the optimum degree of substitutions of quality for quantity. Simple mixtures are preferred to complex ones because the latter often reduce yields.

4. Some species perform better under one particular form of management. For example it has been found that grasses with jointed stems such as smooth bromegrass, produce more under a rotational grazing system than a continuous grazing system. (10) (14)

Moore (20) suggests that pastures in South Dakota be cross-fenced and planted to different grasses so that each is grazed at its optimum. He proposed that the pasture area be divided as follows: early spring 25 percent, late spring, early summer and some late summer grazing 38 percent, midsummer 12 percent, and late fall 25 percent. When this system has been employed production has increased from 1.5 acres of pasture per animal unit for four months to 1.5 acres of pasture per animal unit for seven months.

Results of an Ohio study (31) show that summer pasture slumps could be compensated for by using deferred grazing or combinations of round bales of early growth and accumulated regrowth. It was shown that forage can be stored in fields as standing material or round baled hay to supply livestock feed for all or part of the winter. In order to take advantage of these management methods a combination of tall fescue for winter

pasture, bluegrass and tall fescue for early spring and late fall pasture and orchardgrass for first crop hay and summer grazing was recommended.

While these and other studies have proposed general guidelines for technical efficiency in the utilization of forages, the individual beef cow producer is still faced with the vexing problem of selecting the combination of forage production that will provide the economic optimum. The factors that will influence this decision are many. They include such things as the quantity and quality of land available, amount of operator labor available, amount of hired labor available, and its prices. The response of legume and grass forages to fertilizer, prices of fertilizer, and lime, insecticides, herbicides and other inputs, expected yields and prices, and the distributional pattern of forages under different managements.

The task of accounting for all these things is nearly impossible using ordinary budgeting procedures. Linear programming, which provides a reasonably accurate basis for such decision making, has been available for several years. Because of the need to employ highly skilled individuals with specialized training in the construction and interpretation of linear programming models, linear programming has not been widely utilized on an individual farmer basis. This is primarily due to the lack of trained individuals and the prohibitive costs associated with such a program. In recent years an effort has been made to develop linear programming systems that substitute computer time for man time. Such systems have been developed and utilized at Purdue University, University of Illinois and Iowa State University.

The specific objective of this study is the development of a model and a systemized program that can be utilized in making an economic evaluation while simultaneous consideration is given to the quantity and quality of available land, the responses of perennial forage crops to fertilizer, costs of fertilizer, lime, insecticides and herbicides, the distributional patterns of forages placed under different managements, yield expectations, production prices, and technological requirements. Specifically the model will seek to facilitate the following decisions:

1. The optimal combination of grain and forage crops on a given land base with varying land qualities.

2. The optimal varieties and combinations of forages that should be selected for production and the type of management under which they should be produced.

3. The number of beef cows that are optimally suited to an individual farm.

4. The optimal use of crop refuse material.

5. The profitability of labor hiring.

BASIS FOR EVALUATION

In order to effectively evaluate, in an economic framework, the many alternative production possibilities that face the individual farmer it is necessary to specify a particular goal or objective. This objective will vary, depending upon how the economic unit being considered is defined. If the unit is a farm as a pure firm, the relevant objective would be the maximization of profit. If the economic unit includes the farm business and the family household in combination the relevant objective would be the maximization of the family's welfare or utility. In both cases efficiency in production is attained when the resources are organized in such a manner that allow fulfillment of the particular objective.

For purposes of this study the economic unit is an individual farm, thus the appropriate objective for our analysis would be profit maximization. The conditions necessary for profit maximization under perfect competition can be illustrated by the objective function for constant returns to scale which follows.

$$\text{Maximize } P=p_1 a_1 X_{11}^{b_{11}} X_{21}^{b_{21}} + p_2 a_2 X_{12}^{b_{12}} X_{22}^{b_{22}} - p_{x1}X_{11} - p_{x1}X_{12} - p_{x2}X_{21} - p_{x2}X_{22}$$

This particular function embodies the production of two commodities from two resources. p_i represents the price received for the i^{th} good produced, p_{xi} represents the price of the i^{th} input, and X_{ij} represents the amount of the i input used to produce the j^{th} commodity. Since the production function has constant returns to scale b_{11} plus b_{21} and b_{12} + b_{22} equal one.

Setting the partial derivatives of this objective function to zero we have:

$$\frac{\partial P}{\partial X_{11}} = b_{11}p_1a_1X_{11}^{b_{11}-1}X_{21}^{b_{21}} - p_{x1} = 0$$

$$\frac{\partial P}{\partial X_{21}} = b_{21}p_1a_1X_{11}^{b_{11}}X_{21}^{b_{21}-1} - p_{x\,2} = 0$$

$$\frac{\partial P}{\partial X_{12}} = b_{12}p_2a_2X_{12}^{b_{21}-1}X_{22}^{b_{22}} - p_{x1} = 0$$

$$\frac{\partial P}{\partial X_{22}} = b_{22}p_2a_2X_{12}^{b_{12}}X_{22}^{b_{22}-1} - p_{x2} = 0$$

Thus the input should be employed until the value of the marginal product received from a factor is equal to the price of the factor, i.e. $MVP_{xi} = P_{xi}$.

By rewriting the above equations the following expressions can be derived.

$$P_{x1} = b_{11}p_1a_1X_{11}^{b_{11}-1}X_{21}^{b_{21}} = b_{12}p_2a_2X_{12}^{b_{12}-1}X_{22}^{b_{22}}$$

$$P_{x2} = b_{21}p_1a_1X_{12}^{b_{11}-1}X_{21}^{b_{21}-1} = b_{22}p_2a_2X_{12}^{b_{12}}X_{22}^{b_{22}-1}$$

$$\text{or } \frac{P_1}{P_2} = \frac{MPP_{12}}{MPP_{11}} = \frac{MPP_{22}}{MPP_{21}}$$

Where MPP_{ij} represents the marginal physical productivity of input i in the production of commodity j. This condition states that the inputs should be employed in the production of all commodities until the ratios

of the marginal physical productivities equal the price ratio of the commodities. Because both marginal productivity ratios are equal to the same price ratio the following relationship can be derived from the expression above:

$$\frac{MPP_{11}}{MPP_{21}} = \frac{MPP_{12}}{MPP_{22}}$$

This states that the marginal rate of technical substitution of input 1 and 2 must be equal in the production of both commodities. Thus these three conditions should serve as criteria for the decision-making process.

In order to meaningfully apply these criteria it is necessary to have accurate prices, both for the inputs and the services committed to an enterprise and the products forthcoming from it. Markets generally supply accurate prices for most agricultural inputs and products. However, in the case of beef cow production which utilizes non-tillable land and crop aftermath there is no viable market to establish relevant prices. Neither does the market provide prices that can be depended upon to indicate differences in the value of output units among time period within the year.

Linear programming provides a method of evaluating alternative forage production by allowing the application of the economic efficiency criteria above without the specification of accurate prices for all inputs and outputs. The model used to make this evaluation is discussed in the next section.

STRUCTURE OF LINEAR PROGRAMMING MODEL

In developing a forage plan for the beef cow herd, there are two major nutritional requirements that must be met; energy and protein. Of these two, energy has received the greater amount of attention because of its limiting nature; i.e. when the energy requirement is met the protein level required is generally also satisfied. However, with the increased use of low protein roughages, such as corn stalks for wintering purposes, the level of protein in the ration could become critically low and thus merits consideration in developing a forage plan.

Nutritional needs of the cow-calf unit can be divided into two general categories, needs for maintenance and needs for production. While the maintenance requirements will remain constant throughout the year the requirements for production will vary. The size of the animal will be the primary determinant for maintenance needs, while needs for production will be governed by the calving season and lactation.

The monthly distribution of the 4100.97 pounds of total digestible nutrients (TDN) and 188.61 pounds of digestible protein required by a 1000 pound beef cow calving in April is given in Table 5. The average daily TDN requirement for this dry cow is 8.43 pounds of TDN. By the first of May the daily requirement for the cow and calf has increased 45 percent. The digestible protein change is even more dramatic, increasing from an average .68 pounds per day requirement for a dry cow to 1.25 pounds per day for a cow and calf in May, an 84 percent increase. By the time the calf has reached seven months of age the average daily TDN requirement for a cow and calf has reached 14.44 pounds per day, approximately 71 percent

Table 5. Daily total digestible nutrients and digestible protein required by cow calf unit on a monthly basis[a,b]

Month	Requirement For Maintenance	Reproduction	Milk Production
Total Digestible Nutrients			
January	7.87	.40	
February	7.87	.74	
March	7.87	1.38	
April	7.87		2.56
May	7.87		2.85
June	7.87		3.13
July	7.87		3.13
August	7.87		2.56
September	7.87		2.00
October	7.87	.05	.85
November	7.87	.10	
December	7.87	.20	
Total			
Digestible Protein			
January	.64	.03	
February	.64	.05	
March	.64	.11	
April	.64		.36
May	.64		.40
June	.64		.44
July	.64		.44
August	.64		.36
September	.64		.28
October	.64	.01	.12
November	.64	.01	
December	.64	.02	

[a]Source: L. A. Maddox (19).

[b]This table assumes that the cow is bred to calve in April and will wean a 400 pound calf in November.

[c]The requirements for the calf are those above what is received in the milk from the cow.

Calf[c]	Requirement For Total Daily Requirement	Total Monthly Requirement
	8.27	256.37
	8.61	241.08
	9.25	286.75
.73	11.16	334.80
1.34	12.06	373.86
1.98	12.98	389.40
2.56	13.56	420.36
3.51	13.94	432.14
4.44	14.31	429.30
5.67	14.44	447.64
	7.97	329.10
	8.07	250.17
		4100.97
	.67	20.77
	.70	19.60
	.75	23.25
.16	1.16	34.80
.21	1.25	38.75
.25	1.33	39.90
.29	1.37	42.47
.40	1.40	43.40
.48	1.40	42.00
.64	1.41	43.71
	.65	19.50
	.66	20.46

more than a dry cow. At the same time the digestible protein requirement has increased to 1.41 pounds per day, an increase of more than 100 percent.

These wide variations in nutrient needs throughout the year make it necessary to use more accurate figures than average yearly TDN and digestible protein to insure proper nutritional levels. While separating the cow's requirements into those needed while dry and those needed while in production does provide for a great deal more accuracy, this breakdown is not of much help in specifying the supply of nutrients from forages. For this reason it was decided to use a monthly breakdown of nutrient needs and supplies.

In calculating the total amount of TDN and digestible protein required in any one month, it is important to include also the number of replacements and bulls that will be required for the herd. In any herd the number of replacements needed will depend on the number of cows culled from the herd each year. The model is structured so as to allow for two competitive sources of replacements, raising or purchase of bred heifers. It is assumed in the model that if replacement heifers are raised it is necessary to raise three percent more than the number of cows culled because of death losses and other mishaps that occur during the production of a replacement. Just as the number of replacements depends on the number of cows culled from the herd, the number of bulls required depends on the number of cows in the herd. For purposes of planning it is assumed that one bull can service 25 cows or replacements.

Because it is desired to find the optimal number of beef cows on an individual farm, the nutritional coefficients for the beef herd and the assumptions stated above were embodied in the internal part of the linear programming matrix rather than in the resource column. Table 6 illustrates the structure used. The equations formulated to express these nutritional requirements and assumptions are stated as maximum restraints; thus the positive coefficients in these equations represent demands that must be satisfied by other activities in the model. Using this type of structure allows the beef cow activity to seek its optimal level. As it does so, it automatically adjusts the total nutrient requirement for each month.

Once the nutritional requirements have been adequately defined, attention can be turned to an even more complexing problem, "What is the most economical way to supply the needed nutrients?"

In pursuit of the answer to this question one must be conscious of the resource restrictions within which the optimization must be made. The two resource restrictions recognized by the model are land and labor. Because of the great diversity of land types or qualities in the areas of large beef cow production the land resource is divided into three separate restraints: Class A land, Class B land, and Class C land. Class A land is defined as land that can be continuously row cropped. Class B land is land that will be placed in a rotation with a cover crop, while Class C land must be maintained in permanent pasture. This formulation of the land restriction is identical to forming three separate restrictions.

The labor resource is also divided into several restrictions. For this resource there are nineteen different restraints, each restraint

Table 6. Structure used in linear programming model to represent the nutritional demands and other assumptions made about the beef cow herd

Rows[a]	Activities: Replacements	Bull	Cow-Calf	Cull Cow Selling	Replacement Buying	Heifer Selling	Steer Selling
TDN-JA	605	486	256				
TDN-F	546	439	241				
TDN-M	605	486	287				
:							
TDN-D	486	486	250				
DP-JA	58	62	21				
DP-F	53	56	20				
DP-M	58	62	23				
:							
DP-D	56	62	20				
C-Cow			- .16	1			
REP	- .97		.16		-1		
STEER			- .45				1
Heif			- .45			1	
BULLR		- 25	1				

[a]The rows identified with: "TDN-" are the equations for TDN each month of the year; the rows identified with "DP-" are the equations for digestible protein; the row identified with "C-COW" is the equation for cull cows; the row identified with "REP" is the equation for replacements; the row identified with "STEER" is the equation for steer feeder calves; the row identified with "HEIF" is the equation for feeder heifers; the row identified with "BULLR" is the bull requirement equation. All equations represent maximum restrictions.

representing a specific time period of the year. During the periods of peak labor utilization, spring and fall, the time period was specified to be a length of fifteen or sixteen days. This formulation of the labor restrictions recognizes that labor cannot be freely substituted among seasons or even among periods, i.e. labor must be used when it is available, it cannot be saved and used at a later time.

Within the framework of these resource restrictions, several alternative methods of furnishing the TDN and digestible protein required by the cow herd were formulated. The types of forages selected as alternatives for consideration in the model are ones adapted to the southern Iowa area. They included the following:

1. Kentucky Bluegrass,
2. Birdsfoot Trefoil,
3. Tall growing cool season grasses - smooth brome, orchardgrass, tall fescue and reed canarygrass,
4. Alfalfa-grass,
5. Crown Vetch,
6. Switchgrass,
7. Supplemental - sorghum-sudangrass, forage sorghum,
8. Silage production - corn, forage sorghum, and oats,
9. Miscellaneous - meadow aftermath, meadow aftermath with round bales, new seedlings, cornstalks, and grain sorghum stover.

Because of the different growth habits of these forages it is assumed that they will be grown as pure stands, except in the case of alfalfa. This allows the individual producer to make more effective use of his

forages by capitalizing on their different growth patterns. The simple species or simple mixture is also easier to manage than the complex mixture.

The grass, grass-legume, and supplemental types of forage were then placed under different types of management. This was done in an effort to make the nutrient flow from these forages more uniform than can be obtained by continuously grazing all forages. The types of management considered in the model were as follows:

1. Rotational grazing involves comparatively short periods of grazing for each field and a recovery period to allow more effective consumption of forage with less waste from trampling, fouling and selective grazing. This system permits the farmer to match grazing more adequately to the growth habit of forage species, condition of pasture and animal needs than does continuous grazing. This type of grazing also favors legume persistence.

2. Stockpiling for fall involves holding animals off the pasture until September or October. Cattle are then allowed to graze this growth through the fall and winter months. This type of management serves as an alternative to feeding cattle harvested hay during these periods.

3. Three-season grazing system resembles the rotational grazing system but is used primarily for the tall growing cool season grasses. Applying this system to cool season grasses, grazing is begun in April and continued until June or July. The cattle are then removed during the summer months and replaced either in September or October for fall grazing. This

allows for the utilization of these forages when growth is rapid and quality is high.

4. Harvesting one to three crops and grazing the regrowth. This type of management allows for storing of high quality excess forage during peak production periods to be used during periods of low production. Depending on the number of crops harvested and the species of forage, the regrowth could be used for grazing during summer or fall.

5. Harvesting one or two crops for storage and harvesting second or third crop as small or large round bales to be grazed with aftermath. This type of management allows for storing the excess forage and also increases the amount of forage available for grazing during the fall through the use of round bales.

6. Continuous grazing was included because of its wide usage and applicability to the growth patterns of certain forages. This system of management involves placing cattle on pasture during spring and remaining there until fall.

7. Alternate grazing is very similar to the three-season type grazing except the grazing season does not span three seasons of the year. This type of management was used for annual supplemental pastures such as sorghum sudan. Using this grazing management, sorghum sudan is grazed during the summer months of July, August and September. The cow herd is then removed from the pasture until November when it is again allowed to graze the sorghum sudan.

While the management practices listed above deal with the distribution of the forage, the level of fertilizer will affect the quantity available

for distribution. This is particularly true for cool season grasses and levels of nitrogen application as evidenced by grazing studies in Southern Iowa. These studies have shown that beef output per acre can be doubled in bluegrass pasture by applying 60 pounds of nitrogen and 9 pounds of phosphorus (20 pounds of P_2O_5) per acre (1). Fertilizer application rates used for the linear programming model assume all renovated pastures will receive the fertilizer necessary for yield maintenance. For the widely utilized cool season grasses, orchardgrass, smooth brome, reed canarygrass, and Kentucky bluegrass, two fertilizer levels are considered because of their response to nitrogen fertilizer. The assumed fertilizer application rates are given in Table 7.

Combinations of these three factors were used to develop the alternative forage production activities in the model. For each alternative forage production activity there is an assumed monthly distribution of nutrients determined by the type of forage, type of management and fertilization level. The forage production alternatives and their distributions are presented in Appendix B.

The structure used to reflect the nutrient availability from the perennial forage production activities is illustrated in Table 8. Each perennial forage production activity has a unique nutrient distribution that is connected to the cow-calf production activities by means of the TDN and digestible protein equations. Since these equations have been formulated as maximum restrictions, the negative coefficients in these equations imply that these activities are nutrient sources. If the supply of nutrients should exceed the demand during the grazing season, it is

possible to store the excess in the form of baled hay. This hay is then fed as the need arises by a series of feeding activities. A similar structure is applied to the other types of perennial forages considered in the model to give the many alternative perennial forage production activities.

Table 7. Fertilizer rates in pounds per acre needed to maintain yields for perennial forages

Forage Types	Fertilizer		
	N	P_2O_5	K_2O
Alfalfa-grass	0	40	80
Birdsfoot Trefoil	0	30	30
Crown Vetch	0	40	80
Kentucky Bluegrass (low level)	0	0	0
Kentucky Bluegrass (high level)	60	20	20
Orchardgrass (low level)	120	40	40
Orchardgrass (high level)	240	40	40
Reed Canarygrass (low level)	120	40	40
Reed Canarygrass (high level)	240	40	40
Smooth Brome (low level)	120	40	40
Smooth Brome (high level)	240	40	40
Switchgrass	60	20	20
Tall Fescue	240	40	40

It should be pointed out that perennial forage production was not considered an alternative on all classes of land. The alternative crop production activities on Class A land are restricted to row crops; corn, soybeans, grain sorghum, and high producing supplemental forages such as forage sorghum and sorghum sudan. Any forage produced on Class A land comes from the harvest or grazing of crop residues, supplemental pastures or corn silage. The major crop residue given consideration in the model

Table 8. Illustration of the structure used to reflect the monthly nutrient availability of perennial forages[a]

Rows[b]	Activities[b] OG1CG	OG13S	OGH21	ORB01	ORBN1	ORBD1	OLB01	OLBN1
Land B	1	1	1	1	1	1	1	1
:								
TDN-JA				-384	-384	-480	-438	-438
TDN-F						- 95		
TDN-M				- 94	- 94	- 95	-109	-109
TDN-A	- 47	- 48						
TDN-MA	-607	-609						
TDN-J	-607	-609						
TDN-JL	-341	-190						
TDN-AU	-239							
TDN-S	-319							
TDN-O	-195	-256	-255	- 95			-109	
TDN-N		-350	-349	-192	-288		-219	-329
TDN-D		- 96	- 95	-384	-384	-480	-438	-438
DP-JA				- 58	- 58	- 73	- 65	- 65
DP-F						- 14		
DP-M				- 14	- 14	- 14	- 16	- 16
DP-A	- 8	- 8						
DP-MA	-102	-102						
DP-J	-102	-102						
DP-JL	- 57	- 32						
DP-AU	- 40							
DP-S	- 53							
DP-O	- 26	- 43	- 43	- 14			- 16	
DP-N		- 59	- 58	- 29	- 44		- 32	- 43
DP-D		- 16	- 16	- 58	- 58	- 73	- 65	- 65
OGH			- 2	- .99	- .99	- .99	- .99	- .99

[a]Example uses orchardgrass as the type of forage, similar structure is used for all other perennial forages.

[b]For meaning of activity and row names see Table 9.

Activities								
OLBD1	OG23S	OG2H2	OG2H1	OGRB2	OGHJ	OGHF	OGHM	OGHD
1	1	1	1	1				
-548				-470	-704			
-109						-704		
-109				-117			-704	
	- 72							
	-855							
	-1045							
	-475							
			-224					
	-224	-224	-448	-117				
	-574	-574	-574	-235				
-548	-320	-320	-320	-470				-704
- 81				- 72	- 80			
- 16						- 80		
- 16							- 80	
	- 12							
	-144							
	-176							
	- 80							
			- 37					
	- 37	- 37	- 75	- 18				
	- 96	- 96	- 96	- 36				
- 81	- 53	- 53	- 53	- 72				- 80
- .99		- 3.68	- 2.98	- 2.98	1	1	1	1

Table 9. Meaning of Table 8 abbreviated activity and row names

OG1CG	continuous grazing of orchardgrass with 120 pounds of nitrogen applied per acre
OG13S	3-season grazing of orchardgrass with 120 pounds of nitrogen applied per acre
OGH21	harvesting two crops of orchardgrass hay for storage with 120 pounds of nitrogen applied per acre
ORB01-ORBD1	harvesting one crop of orchardgrass hay for storage and a second as small round bales to be grazed with the regrowth during the winter, 120 pounds of nitrogen applied per acre
OLB01-OLBD1	harvesting one crop of orchardgrass hay for storage and a second as large round bales to be grazed with the regrowth during the winter, 120 pounds of nitrogen applied per acre
OG23S	3-season grazing of orchardgrass with 240 pounds of nitrogen applied per acre
OG2H2	harvesting two crops of orchardgrass hay for storage with 240 pounds of nitrogen applied per acre
OG1H1	harvesting one crop of orchardgrass hay for storage with 240 pounds of nitrogen applied per acre
OGRB2	harvesting one crop of orchardgrass hay for storage and a second as small round bales to be grazed with the regrowth during the winter, 240 pounds of nitrogen applied per acre
OGHJ-OGHD	feeding a ton of orchardgrass hay during each month of the year
Land B	restraint on Class B land
TDN-JA-TDN-D	equations representing the TDN requirements and supplies
DP-JA-DP-D	equations representing the digestible protein requirements and supplies
OGH	equation expressing the availability of orchardgrass hay for feeding

is corn stock refuse. Activities were developed to allow for the grazing or harvest of cornstalks. If cornstalks are grazed, activities permit grazing the complete fall or only a portion of the fall. If grazed only a portion of the fall or harvested, the ground can be fall tilled for next year's crop. If grazed all fall, the tillage must take place in the spring.

Table 10 illustrates the structure used to represent the nutrients produced for corn silage and corn refuse. These forage production activities are another source of TDN and digestible protein for the cow herd; thus the negative coefficients in the TDN and digestible protein equations.

The other sources of forage production on Class A land include grain sorghum stubble grazing forage sorghum deferred fall grazing, sorghum sudan alternate grazing, and sorghum sudan deferred fall grazing. The structure used for grain sorghum stubble grazing and forage sorghum silage is similar to the structure of cornstalk grazing and silage harvesting. The structure of the forage sorghum and sorghum sudan grazing activities is similar to the structure used for the perennial forages.

Activities allowing for alternative timing of row cropping operations have been included in the model, activities such as CHO1 and CHO2 in Table 10. This allows some choice as to when an operation is undertaken and also some flexibility should labor become extremely restrictive in any time period. Alternative timeliness activities are allowed for plowing and planting as well as harvesting. It is assumed, however, that all operations will be completed in time to deter any yield reductions.

Table 10. Structure used to provide for nutrients supplied by corn

Rows[a]	Activities[a]									
	CHO1	CHO2	CSH1	CSH2	CSSH1	CSSH2	CSG1	CSG2	CSG3	FPO1
L-O1	1.27									
L-O2		1.27								
L-N1										
L-N2										
SCA	1	1								
CSMO1	-1		1				1			1
CSMO2	-1	-1	1	1			1	1		1
CSMN1	-1	-1	1	1	1	1	1	1	1	1
SCAP			1.2	1.2						
HCSF			-3.3	-3.3						
HCSSH					-2.2	-2.2				
TDN-JA							- 91	-96	-110	
TDN-F										
TDN-O							-105			
DP-N							- 7	-10	- 5	
DP-D							- 5	- 7	- 11	
SIL										
FPO1										-1
FPO2										-1
FPN1										-1

[a]For meaning of activity and row names see Table 11.

			Activities							
CSGO2		CSL1	CSL2	CSFJ	....CSFD	CSSHFJ	..CSSHD	CSJ	....CSD	
1		1	1							
1										
1										
		5	5							
				-349		-450		-332		
-105										
					-7	- 22	-22			-23
		-17	-17					1		
-	1									

Table 11. Meaning of Table 10 abbreviated activity and row names

CHO1	corn grain harvesting October 1-15
CHO2	corn grain harvesting October 16-30
CSH1	cornstalk harvesting with flail chopper October 1-15
CSH2	cornstalk harvesting with flail chopper October 16-30
CSSH1	cornstalk harvesting with stakhand November 1-15
CSSH2	cornstalk harvesting with stakhand November 16-30
CSG1-CSG3	cornstalk grazing beginning October, November or December
FPO1	transfer for cornstalks directly to fall plowing
CSGO2	cornstalk grazing during October 16-31 and then fall plowing
CSL1	corn silage harvest September 1-15
CSL2	corn silage harvest September 16-30
CSFD	monthly activities for feeding cornstalks harvested with a flail chopper. Restricted to the months of November through March
CSSHFJ-CSSHFD	monthly activities for feeding cornstalk harvested with a stakhand. Restricted to the months of December through March
CSJ and CSD	monthly activities for feeding corn silage
L-O1	labor restraint for October 1-15
L-O2	labor restraint for October 16-31
L-N1	labor restraint for November 1-15
L-N2	labor restraint for November 16-31
SCA	equation representing the availability of mature unharvested corn
CSMO1	equation representing the availability and use of cornstalks during the October 1-15 period
CSMO2	equation representing the availability and use of cornstalks during the October 16-31 period
CSMN1	equation representing the availability and use of cornstalks during the November 1-15 period
SCAP	restraint on the dry matter capacity of the silo
HCSF	equation representing the availability and use of cornstalks harvested with a flail chopper

Table 11 continued

HCSSH	equation representing the availability and use of cornstalks harvested with a stakhand
TDN-JA-DP-D	equations representing the TDN and digestible protein requirements and supplies
FPO1	equation representing the acres of cornstalks that could be fall plowed during the October 1-15 period
FPO2	equation representing the acres of cornstalks that could be fall plowed during the October 16-31 period
FPN1	equation representing the acres of cornstalks that could be fall plowed during the November 1-15 period

Table 12. Example of structure used in determining yearly renovation acres

Rows[a]	Activities[a] OG1CG	OG13S	OGH21	ORB01	...OLBD1	OGRP	AGRG	AGH1
Land B	1	1	1	1	1		1	1
:								
TDN-JA				-384	-548			
TDN-F								
:								
TDN-J	-607	-609					-607	
TDN-JL	-341	-190					-474	-533
TDN-AU	-239						-399	-449
TDN-S	-319						-159	-160
TDN-O	-159						-367	-433
:								
DP-N				- 29				
DP-D				- 58	- 81			
OGR	1	1	1	1	1	-8		
NCR						1		
SOGR						-1		
AGR							1	1
SAG								
OG								
STR								
OS								
OH								

[a]For meaning of activity and row names see Table 13.

Activities									
AGH2	AGH3	AGRP	OATP	OATGA	OATSA	OATHA	OATGO	OATSO	OATHO
1	1		1						
						-189			-190
-448				-240		-239	-240	-240	-240
-160									
-432	-432			-160	-160	-159	-160	-160	-160
				- 33	- 33	- 33	- 23	- 23	- 23
		1	-1						
							1	1	1
1	1	-3							
		-1		1	1	1			
				- 70			- 70		
				- .7			- .7		
					- 6.11			- 6.11	
						- 1.03			- 1.03

Table 13. Meaning of Table 12 abbreviated activity and row names

OG1CG	continuous grazing orchardgrass with 120 pounds of nitrogen applied per acre
OG13S	3-season grazing orchardgrass with 120 pounds of nitrogen applied per acre
OGH21	harvesting two crops of orchardgrass hay for storage and grazing the regrowth in fall; 120 pounds of nitrogen applied per acre
ORBO1-OLBD1	harvesting one crop of orchardgrass hay for storage and the second as round bales to be grazed during the winter with the regrowth; 120 pounds of nitrogen applied per acre
OGRP	orchardgrass renovation
AGRG	rotational grazing alfalfa-grass
AGH1	harvesting one crop of alfalfa-grass hay for storage and grazing the regrowth
AGH2	harvesting two crops of alfalfa-grass hay for storage and grazing the regrowth
AGH3	harvesting three crops of alfalfa-grass hay for storage and grazing the regrowth
AGRP	alfalfa-grass renovation
OATGA	harvesting oats as grain on alfalfa-grass renovated acres and grazing regrowth
OATSA	harvesting oats as silage on alfalfa-grass renovated acres and grazing regrowth
OATHA	harvesting oats as hay on alfalfa-grass renovated acres and grazing regrowth
OATGO	harvesting oats as grain on orchardgrass renovated acres and grazing regrowth
OATSO	harvesting oats as silage on orchardgrass renovated acres and grazing regrowth
OATHO	harvesting oats as hay on orchardgrass renovated acres and grazing regrowth
Land B	Class B land restraint
TDN-JA-DP-D	equations representing the TDN and digestible protein requirements and supplies

Table 13 continued

OGR	equation representing the amount of yearly orchardgrass renovation needed
NCR	equation representing nurse crop requirements
SOGR	equation expressing the alternative methods of utilizing oats produced on renovated orchardgrass acreage
AGR	equation representing the amount of yearly alfalfa-grass renovation needed
SAG	equation expressing the alternative methods of utilizing oats produced on renovated alfalfa-grass acreage
OG	equation representing oat grain production and utilization
STR	equation representing straw production and utilization
OS	equation representing oat silage production and utilization
OH	equation representing oat hay production and utilization

The cropping alternatives considered on Class B land includes all the row crop activities considered on Class A plus the perennial forage production activities. In order to more accurately reflect the type of cropping practices that can be undertaken on this land class, a maximum restraint has been placed on the quantity of row crops allowable. Since the plan derived is normative in nature, it is assumed to be repeated each year; thus the restriction on the row crops can be interpreted as being the maximum number of row crop acres in any one year.

The repetitive nature of the plan also makes it necessary to determine how many acres of perennial forages must be renovated each year. This determination is very important in making an economic decision about which forages will supply the needed nutrients at the lowest cost. Table 12 represents the structure used for determining the acres that must be renovated each year. All equations contained in Table 12 are formulated as maximum restrictions. With this type of restraint, the negative coefficients in the renovation equations, orchardgrass renovation (OGR) and alfalfa-grass renovation (AGR) represent the productive life of the forage. However, since the planning horizon is assumed to be one year in length, the productive life of the forage can be interpreted as the maximum number of acres of forage in production for each acre of renovation. It is this interpretation that was used in developing the renovation equations in the model. This formulation also allows for the simplification of the forage cost calculations. Because yearly expenses are always being deducted from yearly incomes it is not necessary to compound the costs in forage production.

Table 14. Structure used to represent the restraints on Class A and B land

Rows[b]	B	Activities[a] Land A	Land B
Land 1	50	1	
Land 2	150		1
Land A		-1	
Land B			-1
BMAX		- .5	
MAXRC			- .333
BMAXB			- .167

[a]Meaning of abbreviated activity names:

Land A activity that specifies the amount of Class A land available for crop production and the maximum restraint on soybean production.

Land B activity that specifies the amount of Class B land available for crop production and the maximum restraints on row crops and soybeans.

B resource restraint level.

[b]Meaning of abbreviated row names:

Land 1 equation representing the restriction on Class A land.

Land 2 equation representing the restriction on Class B land.

Land A equation representing the supply of Class A land that can be used for crop production.

Land B equation representing the supply of Class B land that can be used for crop production.

BMAX equation representing the maximum soybean production on Class A land.

MAXRC equation representing the maximum row crop production on Class B land.

BMAXB equation representing the maximum soybean production on Class B land.

The nurse crop equation assumes that oats will be used as a nurse crop whenever a perennial forage is renovated. The oats grown on the renovated acres can be harvested in any of three different ways, as grain and straw, silage or hay. The straw, silage and hay can be fed to the cow herd through a series of feeding activities. The model also provides the option for straw being sold along with the grain. After the oat crop has been harvested a low level of grazing is permitted.

In addition to the row crop restraint on Class B land there is also a cropping restraint placed on the number of soybeans produced on Class A and B land. Since the marginal value of land in each of these land classes is a function of these restrictions, two activities were used to represent these restrictions rather than placing them in the resource column. An example of the structure utilized for restraining the proportion of Class A land in soybeans and Class B land in row crops and soybeans is shown in Table 14. This example assumes that soybeans can be grown on only fifty percent of the row crop land, and row crop production on Class B land must be restricted to fifty acres per year. The activity unit for both the Land A and Land B activities is defined to be one acre; thus the restrictions on soybeans and row crops must also be expressed on a per acre basis. This can be done by dividing the maximum level of each restriction by the number of acres in each land class. An example of such a coefficient would be the one found in the BMAXB equation. This coefficient is calculated as follows:

$$\frac{\text{Maximum soybean production Class B}}{\text{Total Class B land}} = \frac{25}{150} = .167$$

Since all equations in this figure are maximum restrictions this coefficient will have a negative sign in the model representing the fact that for each acre of Class B land used in crop production we are permitted .167 acres of soybeans.

The long lived perennial forages Kentucky Bluegrass, Crown Vetch, and Birdsfoot Trefoil are the only production alternatives considered on Class C land. The structure utilized for these forages is the same as that discussed for the Class B perennial forage alternatives.

METHODOLOGY AND ASSUMPTIONS USED FOR INDIVIDUALIZATION OF THE MODEL

The computerized procedure used to derive individualized solutions is a three step program. The first step involves a FORTRAN source program that generates new resource and technical coefficients for each farm. The second step requires the use of these generated coefficients in the revision and reoptimization of the model by the MPSX routine. Step three consists of the use of another FORTRAN source program to report the results in a manner that can be easily understood by farmers.

The special input form designed to collect the information needed for individualization of the prestructured model is found in Appendix C. This information can be directly punched onto cards and utilized by the first FORTRAN program for generation of new resource and technical coefficients. These forms have been divided into fourteen different sections, each relating to a specific aspect of the farm business.

Section 1 specifies the land and facility resources available on each farm. The individual land restraints in the model are specified using the information contained in questions one, four and nine. The information on the maximum acres of soybeans is used to restrict their production level. This restriction is placed in the model to allow for the disease preventative measure of growing soybeans in rotation with other annual crops.

This section also provides for restraints on size of the beef herd. The shelter capacity provides for an upper limit, while the size of the beef herd that must be maintained based on a subjective criterion constitutes the lower limit. If these two restraints are set at the same level,

the size of the beef herd can be specified exactly by the individual operator.

It is also possible to nullify either one or both of these restrictions by the response given to these two questions. The capacity restriction can be made nonrestrictive if answered with a large number while the minimum restriction can be abolished by specifying a zero for the size of beef herd that must be maintained.

The yields specified in Section 2 and 3, as stated, should represent the average yields expected from each crop. These yields should reflect the normal weather and cropping conditions that the individual farmer has experienced. In cases where farmers do not wish to consider a particular crop or type of forage among their alternatives, a yield of zero should be entered. The yields in Section 3 are used for calculating the distribution of the TDN and digestible protein for crop residues and supplemental forages. The potential yields given in this section are reduced to reflect losses during grazing or harvesting. The assumed grazing and harvest efficiencies are given in Table 15.

Table 15. Grazing and harvesting efficiencies assumed in calculating the nutrient availability of supplemental forages and crop refuse

	Percent Efficiency
Cornstalks grazed	15.0
Cornstalks harvested (flail)	45.0
Cornstalks harvested (stakhand)	55.0
Forage sorghum stockpiled for fall	40.0
Forage sorghum stubble	45.0
Grain sorghum stubble	35.0
Sorghum sudan alternate graze	55.0
Sorghum sudan stockpile fall	40.0

Table 16. Grazing and harvesting efficiencies assumed in calculating the nutrient availability of perennial forages[a]

		Percent Efficiency
Alfalfa-grass rotational graze		65.0
Alfalfa-grass grazing regrowth after harvest		60.0
Birdsfoot Trefoil grazing		65.0
Crown Vetch continuous grazing		60.0
Kentucky Bluegrass continuous grazing		60.0
Kentucky Bluegrass 3-season grazing		65.0
Orchardgrass continuous grazing and grazing of regrowth after harvest		60.0
Orchardgrass 3-season grazing		65.0
Reed Canarygrass continuous grazing and grazing of regrowth after harvest		55.0
Reed Canarygrass 3-season grazing		58.0
Smooth Brome continuous graze and grazing of regrowth after harvest		64.0
Smooth Brome 3-season graze		69.0
Tall Fescue grazing regrowth after harvest		52.0
Tall Fescue 3-season graze		57.0
Alfalfa-grass harvested for hay		75.0
Birdsfoot Trefoil harvested for hay		75.0
Orchardgrass harvested for hay		70.0
Reed Canarygrass harvested for hay		70.0
Smooth Brome harvested for hay		73.0
Tall Fescue harvested for hay		68.0
Alfalfa-grass[b]	small round bales	47.0
	large round bales	64.0
Birdsfoot Trefoil[b]	small round bales	47.0
	large round bales	64.0
Orchardgrass[b]	small round bales	50.0
	large round bales	69.0
Reed Canarygrass[b]	small round bales	49.0
	large round bales	67.0
Smooth Brome[b]	small round bales	50.0
	large round bales	69.0
Tall Fescue[b]	small round bales	46.0
	large round bales	64.0

[a]Source: Lechtenberg, Parsons, Petritz, Smith (18), Taylor (30).

[b]The efficiencies for large round bales assume that cows are restricted in their access to these bales. The efficiencies for the small round bales assume that the field will be fenced into strips but cows will be given unrestricted access to the bales in each of these strips.

Sections 4, 5, 6 and 7 of the input deals with the alternate types of perennial forages and the managements an operator may wish to consider. The yields given are in terms of total dry matter available and thus must be adjusted for utilization efficiency when calculating available quantities of TDN and digestible protein. The grazing efficiencies used for these perennial forages are given in Table 16.

Section 8 asks the farmer to supply the prices he expects to pay or receive for his products. These prices should reflect the average net prices the farmer expects during the planning period he is considering. This means that the price of products sold should have the cost of transporting, if incurred by the producer, deducted from the quoted market price; similarly the cost of purchased products should include the cost of transporting to the farm. If the producer does not ordinarily buy or sell some of the products listed, the market value of these products should still be estimated and included.

Production costs and time requirements for the annual crops are reported in Section 9. If an operation listed is performed more than once, the total cost and time required to complete the operation should be specified, i.e. our plan assumes corn will be cultivated one and one-half times; thus the cost and labor figures provided represent the total requirements of performing this operation one and one-half times per year. The labor requirements specified should include only labor demanded from the fixed labor supply. Operations performed by a custom operator should have a labor coefficient of zero and the costs should appear in the "Custom

Hire" section. It is assumed that preharvest production operations undertaken on both classes of land are identical. However, a land class distinction can be made with regard to harvesting and "Other Variable Costs".

Section 10 provides the information pertaining to perennial forage production. The major cost items of perennial forages involve renovation and annual maintenance. The annual maintenance costs of the forages considered are listed in Part D of this section. These costs plus annual fertilizer expenses are combined to give the total maintenance cost. Estimates of cost and time requirements should be made for each maintenance operation, particularly fencing, since the assumed efficiency for grazing of small round bales includes the use of strip grazing.

Total renovation costs of each type of pasture includes seed and drilling. For purposes of calculating per acre seed cost, the seeding rates in Table 17 were assumed.

Table 17. Seeding rates for perennial forages

Alfalfa-Grass	Pound Per Acre
Alfalfa and	8.0
Orchardgrass or Smooth Brome	6.5
Birdsfoot Trefoil	6.0
Crown Vetch	10.0
Kentucky Bluegrass	20.0
Orchardgrass	9.0
Reed Canarygrass	11.0
Smooth Brome	17.5
Switchgrass	6.5
Tall Fescue	13.5

The costs and time requirements associated with harvesting and utilization of the perennial and crop residue forages are specified in Section 11. These cost and time requirements should represent the cost of performing the specified operation once, even though the operation is performed several times per year. If an operation is performed by a custom operator, the labor requirement entered should be zero and the cost placed in the "Machine Hire" section. Part D of Section 11 is used to specify the costs and labor requirements of the different feeding activities contained in the model.

Beef cow costs and information used for calculation of nutrient coefficients are given in Section 12. With information contained in the source program (Appendix A) it is possible to calculate the nutrient requirements for cows ranging in weight from 700 to 1600 pounds and calves weighing 300 to 600 pounds at weaning.

The information in Section 13 is used to define the fixed labor supply and the availability of hired labor. The total hours column is used to define the maximum restraints on the fixed labor supply and the hourly hired labor is used to place a maximum restriction hourly labor hired. This labor hired on an hourly basis may supplement the fixed labor supply. The amount of hired labor needed because the job requires more than one man is not restricted by these restraints.

Section 14 collects the information on fixed costs. While this information is not used in determining the optimal solution it is used in the output program in calculating the returns to management.

Because of the number of iterations that must be carried out to reach the optimal solution, the model with an optimal basis is stored on tape. This information is contained in OLDPFILE of the MPSX routine and when used with the RESTORE REVISE, and SAVE routines the resource and technological coefficients can be changed and reoptimization begun several iterations closer to the optimal solution than the original starting point of zero production. The data needed for the revisions is generated by Step 1 and is stored temporarily on disk. The MPSX program then reads this information and uses it to modify the previously structured model to reflect the individual programming situation. The solutions obtained from the model are also temporarily stored on disk until they are read by the report writer program.

EXAMPLE OUTPUT FROM PRODUCER ORIENTATED MODEL

To illustrate the information obtainable from the program a hypothetical farm unit was constructed. This unit is assumed to be composed of 50 acres of Class A land, 375 acres of Class B land, and 75 acres of Class C land. Row crop production on Class B land is restricted to one-third of the available acreage, 125 acres. For both Class A and B land soybean production will be restricted to approximately one-half of the row crop acreage. The costs, labor requirements and available resources assumed for this unit are specified in the input forms under "Our Plan".

The optimal level of beef production derived for this unit includes 164.12 cows, 6.56 bulls and 21.15 head of replacements. To meet the nutritional demands of this herd the optimal levels of crop production shown in Table 18 were prescribed. Total hay production included 52.18 acres of alfalfa-grass harvested twice with the regrowth stockpiled for fall grazing, 19.53 acres of alfalfa-grass harvested three times and 24.06 acres of tall fescue harvested twice. Pasture production on Class B land was comprised of 22.91 acres of orchardgrass grazed under an early 3-season grazing management, 9.98 acres of birdsfoot trefoil continuously grazed, 74.97 acres of birdsfoot trefoil stockpiled for grazing during the summer and 3.02 acres of reed canarygrass grazed under a 3-season management. Continuously grazed birdsfoot trefoil composed the 68.18 acres of pasture that was produced on Class C land. It should be noted that all the cool season grasses included in this plan had nitrogen fertilizer applied at the 220 pound rate.

Table 18. Optimal crop acreages for each class of land contained in the solution using "Our Plan" data

	Acres Produced
Class A land	
Corn	50.00
Class B Land	
Corn	121.43
Soybeans	3.56
Oats and Straw	43.37
Hay	95.77
Pasture	110.88
Class C Land	
Oats and Straw	6.82
Pasture	68.18
Total	500.00

In addition to the perennial forages produced for herd maintenance, the optimal program specified the utilization of cornstalks. Cornstalks produced on Class A land were utilized by grazing while those on Class B land were harvested prior to grazing. The fact that cornstalks were not fall plowed on Class A is one indication that labor availability is not a major problem during the spring field preparation periods. Thus more can be gained through grazing cornstalks than fall plowing.

Needless to say there were many forage production alternatives considered in the model that did not enter the optimal plan. For each of these alternatives there is associated a penalty. These penalties are reported on Page 5 of the output contained in Appendix E. They indicate the amount of income sacrificed by including an acre of the rejected alternative in the plan. In evaluating these penalties it is important to remember first, that these are the minimal reductions in returns that will

be incurred by the inclusion of a rejected alternative, i.e. reductions will be even higher if appropriate adjustments are not made in the activities initially in the plan. Since the adjustments leading to these minimal losses are very specific and have not been provided in the output report, inclusion of any rejected forage alternative by farmers will usually result in a larger reduction in income than reported by the penalty. Second, these figures do not say that inclusion of a rejected activity is unprofitable. Instead the penalties reflect the fact that the alternatives which have been selected provide an optimal forage plan and any deviation from this optimum will reduce the estimated income.

The returns generated in this plan include $32,992,65 from corn production, $621.98 from bean production, $2,977.11 from oat production, $1,163.57 from straw production, $5,128.61 from cull cows, $14,955.03 from the sale of steer calves, and $9,183.51 from the sale of heifer calves for a total of $67,022.47. The expenses incurred include $3,574.32 for fuel oil and repairs, $9,497.12 for fertilizer, $1,221.36 for herbicide, $514.29 for insecticides, $2,261.76 for seed, $363.98 for corn drying, $149.24 for machine hire, $4,589.68 in livestock expenses, $358.99 in feeding expenses, $1,112.20 for hired labor, $581.26 in other variable costs and $1,010.35 in interest on variable costs, a total of $25,232,53. The return over variable cost amounted to $41,789.94. A return to management of $6,004.43 was calculated by substracting fixed crop and livestock expenses, fixed labor expense and land expenses.

As illustrated in Table 18 the total amount of land available in each class was used to the fullest extent possible. Because of this fact a

shadow price of greater than zero is reported for each of the three land resource restraints, $150.18, $78.15, $45.81 respectively for Class A, B, and C land. These shadow prices represent the marginal value product of the different land classes and provided insights into possible gains in income that can be made by acquiring larger quantities of the scarce resource. While it is not possible to know exactly over what range of acreages the marginal value products will remain at these levels, it is possible to make some estimate of the path they will follow by observing the levels of other resource utilizations. Table 19 reports utilization of the labor resource and illustrates that there is excess labor in many of the time periods. Thus it could be assumed that the marginal value product of land would remain fairly constant as the land acreage is increased.

The solution also determines when the stored forage should be fed and the return from the last pound of total digestible nutrients or digestible protein required by the feed herd. Table 20 represents how the stored feed was utilized. It can be seen that stored forage was resorted to during periods of year when it was not possible to graze enough forage to meet the herd's needs.

The quantity of TDN needed by the herd is given in Table 21. In all months but October the TDN requirements were just met, thus the shadow prices reported for these months are all greater than zero. These shadow prices report the marginal value product of TDN and provide insights into the profitability of acquiring TDN from purchased forages. To make such a comparison it is necessary to assume a dry matter and total digestible

nutrient percentage for the forage being considered. Using alfalfa-grass hay as an example these percentages would be 62.0 percent and 15.0 percent respectively. Thus in a ton of this hay there would provide 1,240.00 pounds of TDN. Using the return figure for April a ton of this hay would add approximately $47.12 to income.

Table 19. Labor utilization in the optimal program using "Our Plan"

Period	Fixed Labor Utilized	Total Fixed Labor Supply	Hourly Hired Labor	Marginal Value Product
January	104.60	212.57		
February	131.50	192.00		
March 1-15	86.61	115.71		
March 16-31	113.12	123.43		
April 1-15	128.57	128.57	128.57	2.50
April 16-30	128.57	128.57	15.98	2.50
May 1-15	106.12	154.29		
May 16-31	40.56	164.57		
June 1-15	154.29	154.29	28.73	2.50
June 16-30	96.40	154.29		
July	149.79	318.86		
August	62.17	239.14		
September 1-15	23.45	128.57		
September 16-30	26.31	128.57		
October 1-15	26.14	128.57		
October 16-31	137.14	137.14		2.38
November 1-15	128.57	128.57		1.82
November 16-30	20.45	128.57		
December	168.07	257.14		

Table 20. Tons of stored forage fed to beef herd

Month	Type of Forage Alfalfa-grass	Tall Fescue	Flailed Cornstalks	Stakhand Cornstalks
January	55.80	0.00		
February	36.67	0.00	79.02	29.86
March	0.00	95.56	0.00	0.00
April	85.59	0.00	0.00	0.00
May	0.00	0.00	0.00	0.00
June	0.00	0.00	0.00	0.00
July	0.00	0.00	0.00	0.00
August	0.00	0.00	0.00	0.00
September	0.00	0.00	0.00	0.00
October	0.00	0.00	0.00	0.00
November	0.00	0.00	0.00	0.00
December	12.12	5.74	0.00	0.00

Table 21. Monthly total digestible nutrients required by beef herd

Month	TDN Required	Excess TDN	Marginal Value Product
January	59,801.57	0.00	.035
February	49,476.88	0.00	.035
March	73,138.54	0.00	.035
April	68,337.39	0.00	.038
May	84,762.52	0.00	.034
June	77,262.63	0.00	.029
July	84,735.00	0.00	.016
August	86,827.27	0.00	.028
September	86,111.99	0.00	.029
October	50,941.70	25,979.02	.000
November	52,265.58	0.00	.027
December	52,265.58	0.00	.035

Comparison of Optimal Solutions

In order to provide the producer information on how the plan would be altered with changes in the feeder calf price two additional solutions are included in the output. One reports on a solution with feeder calf price fifteen percent higher than in the original solution, the other with feeder calf prices fifteen percent lower. For purposes of the following discussion Solution 1 will refer to the solution with feeder calf prices at their original level, Solution 2 assumes feeder calves will be fifteen percent higher and Solution 3 assumes feeder calf prices fifteen percent lower than in Solution 1.

Table 22 illustrates the types of changes that will take place in crop acreages under these three plans.

Table 22. Optimal crop acreages in each solution using "Our Plan" data

	Solution 1	Solution 2	Solution 3
Class A Land			
Corn	50.00	40.00	50.00
Grain Sorghum	0.00	9.92	0.00
Class B Land			
Corn	121.43	124.99	124.99
Soybeans	3.56	0.00	0.00
Oats and Straw	43.37	38.94	96.92
Hay	95.77	101.21	95.31
Pasture	110.88	109.86	57.78
Class C Land			
Oats and Straw	6.82	6.82	6.82
Pasture	68.18	68.18	68.18
Total	500.00	500.00	500.00
Marginal value product for each class			
Class A	150.18	154.51	150.51
Class B	78.15	89.24	70.68
Class C	45.81	59.66	34.78

As is shown in this table the price rise in Solution 2 caused a shift to a crop system that would support a larger beef cow herd. The optimal size of the beef herd in Solution 2 was comprised of 194.91 cows and 7.80 bulls, replacements were purchased rather than raised. The price decline that occurred in Solution 3 caused a shift to less forage intensive cropping practices and the beef herd was composed of 139.74 cows, 5.59 bulls and 18.01 replacements.

It should also be noted that changes took place with respect to the type of hay and pastures produced. These changes are indicated on Page 5 of each solution. In general as the price of feeder calves increases production is shifted to include more of the high yielding cool season grasses, as price declines production shifts to a large proportion of legume forages.

Changes in the return and expense picture are illustrated in Table 23. The return to management illustrates the fact that even though the price of feeder calves will vary fifteen percent the final return will have a much wider variation.

Comparison of labor utilization reflect the consequences of the different cropping systems in each of the plans. While the majority of the time periods have an excess quantity of labor it is necessary to hire extra hourly labor during spring planting in all three plans. Because of this there were very small changes in the marginal value product of labor for each of the periods. Such was not the case for the marginal value products of land. For the land classes with large acreages of perennial forages the marginal value products rose and fell with the value of feeder

cattle. This would be expected since a land producing these forages derives its value from being utilized by the beef herd. This is in contrast with the value inputed to Class A land, which is derived primarily from grain production.

Table 23. Comparison of the costs and returns for the solution contained in the output report

	Solution 1	Solution 2	Solution 3
Returns			
Corn	32,992.65	31,616.96	33,657.66
Grain Sorghum	0.00	1,833.36	0.00
Soybeans	621.98	0.00	0.00
Oats	2,977.11	2,711.28	6,190.46
Straw	1,163.57	1,057.24	2,448.91
Cull Cows	5,128.61	6,091.08	4,366.79
Steer	14,955.03	20,425.81	10,823.53
Heifers	9,183.51	17,576.29	6,646.46
Total	67,022.47	81,312.02	64,133.81
Variable Expenses			
Fuel, Oil, Repairs	3,574.32	3,568.78	4,088.61
Fertilizer	9,497.12	9,459.59	9,427.18
Herbicide	1,221.36	1,224.91	1,224.91
Insecticide	514.29	524.96	524.96
Seed	2,261.76	2,131.43	2,788.33
Drying Costs	363.98	364.62	372.00
Machine Hire	149.24	348.00	152.12
Livestock Expenses	4,587.68	4,927.44	3,906.21
Hired Labor	1,112.20	1,184.43	1,239.70
Replacements	0.00	9,136.61	0.00
Feeding Cost	358.99	381.12	325.09
Other Variable Cost	581.26	586.11	594.64
Interest	1,010.35	1,034.52	1,006.89
Total	25,232.53	34,872.55	25,650.65
Return over variable cost	41,789.94	46,439.47	38,483.16
Fixed Costs			
Land	12,500.00	12,500.00	12,500.00
Labor	8,000.00	8,000.00	8,000.00
Crop	10,220.00	10,220.00	10,220.00
Livestock	5,065.51	5,347.66	4,450.76
Return to management	6,004.43	10,371.81	3,312.40

OTHER APPLICATIONS AND IMPLICATIONS FOR FUTURE RESEARCH

The preceding discussion illustrates how the model can be utilized to aid producers in planning forage systems that allows each individual to make efficient use of his land and labor resources. In addition to this use it is felt that the model may be useful in answering several other relevant questions concerning beef calf production.

One such application would involve the effects of various fertilizer prices upon the optimal mix of forages used for beef calf production. This price variation could be researched in a series of reoptimizations embodying different fertilizer prices. The model will allow for variations in price of single fertilizer nutrient or a combination of nutrients. Allocation of a restricted fertilizer supply among the alternative crop production activities can also be investigated with only minor modifications made in the model structure. Analysis of both points can be carried out on the basis of a fixed or an optimal herd size for each set of fertilizer prices.

The procedure of several reoptimizations can also be utilized for analyzing the effect of calving date on the optimal mix of forage production activities used to support the beef herd.

The effect of introducing cross-breeding can also be evaluated since this change is reflected in size of the mature cow, weaning weights of calves and the calving percentage. Thus a series of optimizations with these variables altered would provide information about changes that should be undertaken in forage programs to provide for the increased nutrient needs of a herd.

The model can also be used to compare the role of the beef herd under varying leasing systems assuming constant farm size and technologies. By entering the tenant's share of the crops and expenses for each leasing system the outcomes of the optimal plans can be compared for both cash rent and crop share leases.

Varying the quantity of land in each class allows exploration of the role a beef herd would play on a cash grain farm as well as the type of farms where beef herds have traditionally been found.

Although the model at its present stage of development is applicable in many planning situations there are additional extensions which will help to broaden its usefulness.

One such extension would be the inclusion of other livestock activities. On a great many Iowa farms alternative forms of livestock production compete with each other and crop production for labor. This competition greatly affects the optimal levels of the livestock and crop enterprises undertaken. In addition to the labor competition there are certain cattle production activities, such as backgrounding, that would compete directly with beef cows for nutrients from the forages produced. Because of these interactions inclusion of a broader spectrum of livestock production could have a major affect on the marginal value products of both the land and labor resources.

Another useful extension would be the inclusion of a creep feeding alternative for calves. Inclusion of this alternative would provide producers with information as to the profitability of this practice and also

would more accurately reflect the producer's situation where creep feeding is practiced.

As in any linear programming application, there is a constant need for continuing research with regard to production coefficients. This is especially true in a forage planning model, where not only refinement is sought for the costs and labor requirements, but also perennial forage productivities and their distribution throughout the year. Forage research would not only be helpful for improving the existing information on forage management, but also in developing new managements.

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APPENDIX A: TOTAL DIGESTIBLE NUTRIENTS AND DIGESTIBLE PROTEIN REQUIREMENTS OF COW AND CALF

Table 24. Total digestible nutrients and digestible protein required per day by cows of varying weights for maintenance[a]

Weight	TDN	D.P.
700	6.11	.50
800	6.71	.55
900	7.31	.59
1000	7.87	.64
1100	8.43	.69
1200	8.90	.73
1300	9.52	.77
1400	10.06	.82
1500	10.56	.86
1600	11.09	.90

[a]Source: Maddox (19).

Table 25. Daily total digestible nutrients and digestible protein required from pasture by calves of varying weaning weights[a]

Age In Months	Weaning Weight of 300 Pounds TDN	D.P.	Weaning Weight of 400 Pounds TDN	D.P.
1	2.51	.43	3.29	.52
2	3.12	.48	4.19	.61
3	3.69	.53	5.11	.69
4	4.12	.57	5.69	.73
5	4.12	.58	6.07	.76
6	4.38	.58	6.44	.76
7	4.55	.59	6.52	.76

	Weaning Weight of 500 Pounds TDN	D.P.	Weaning Weight of 600 Pounds TDN	D.P.
1	4.13	.64	4.98	.66
2	5.37	.74	6.63	.80
3	6.54	.85	8.12	.92
4	7.49	.91	9.40	1.05
5	8.26	.95	10.47	1.19
6	8.74	.96	11.24	1.37
7	9.08	.96	11.83	1.59

[a]Source: Maddox (19).

APPENDIX B: FORAGE PRODUCTION DATA USED TO DEVELOP BASIC PLAN

Table 26. Abbreviations used in following tables

A	- Land Class A
AG	- Alternate Graze
B	- Land Class B
CG	- Continuous Grazing
HFO1	- Harvest cornstalks with a flail chopper October 1-15
HFO2	- Harvest cornstalks with a flail chopper October 16-31
HSHN1	- Harvest cornstalks with a stakhand during November 1-15
HSHN2	- Harvest cornstalks with a stakhand during November 16-31
H1G	- Harvest one crop of hay for storage and graze regrowth
H2G	- Harvest two crops of hay for storage and graze regrowth
H3G	- Harvest three crops of hay for storage and graze regrowth
O1	- Grazing beginning October 1-15
O2	- Grazing beginning October 16-31
N1	- Grazing beginning November 1-15
RGA	- Rotational grazing
SPF	- Stockpile until fall
SP1	- Stockpile until May
SP2	- Graze early and
3SGE	- 3-season grazing with first grazing period ending in June and second beginning in September
3SG	- 3-season grazing with first grazing period ending in July and second beginning in October
60N	- 60 pounds of nitrogen applied per acre
120N	- 120 pounds of nitrogen applied per acre
240N	- 240 pounds of nitrogen applied per acre

Table 27. Percent of total TDN available for grazing utilized each month[a]

Perennial Forages	Jan.	Febr.	Mar.	Apr.
Alfalfa-Grass RGA				
Alfalfa-Grass H1-G				
Alfalfa-Grass H2-G				
Alfalfa-Grass H2-SPF				
Alfalfa-Grass H3-G				
Birdsfoot Trefoil CG				
Birdsfoot Trefoil SP1				
Birdsfoot Trefoil SP2				2.94
Birdsfoot Trefoil H1-SP2				
Crown Vetch CG				
Kentucky Bluegrass CG				
Kentucky Bluegrass 60N-CG				
Kentucky-Bluegrass 60N-3S				2.18
Orchardgrass 120N-CG				2.06
Orchardgrass 120N-3SG				2.23

[a]Sources: Adopted from Kuhlmann (17) and Schaller (23).

May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
19.11	24.46	19.11	16.09	6.44	14.80		
		33.84	28.50	10.18	27.48		
			43.08	15.38	41.54		
				58.46	41.54		
					100.00		
4.04	29.11	26.68	20.46	12.94	6.81		
	16.12	38.17	22.86	13.57	9.29		
30.57		15.72	23.54	18.39	8.83		
		22.09	34.88	29.07	13.95		
15.90	31.79	23.43	18.32	10.57			
28.65	28.65	12.54	7.54	15.08	7.54		
24.75	28.56	11.42	4.81	15.23	15.23		
25.92	30.24			21.83	10.91	8.91	
26.14	26.14	14.70	10.31	13.76	6.88		
28.20	28.20	8.81			11.87	16.23	4.45

Table 27 (continued)

Perennial Forages (Con't.)	Jan.	Febr.	Mar.	Apr.
Orchardgrass 120N-3SGE				2.43
Orchardgrass 120N-H2G				
Orchardgrass 240N-3SG				2.02
Orchardgrass 240N-H2G				
Orchardgrass 240N-H1G				
Reed Canarygrass 120N-0G				3.80
Reed Canarygrass 120N-H2G				
Reed Canarygrass 240N-3SGE				2.22
Reed Canarygrass 240N-3SG				2.30
Reed Canarygrass 240N-H2G				
Reed Canarygrass 240N-H1G				
Smooth Brome 120N-0G				2.06
Smooth Brome 120N-3SG				2.23
Smooth Brome 120N-3SGE				2.43
Smooth Brome 120N-H2G				

May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
30.77	30.77			12.96	9.72	8.50	4.86
					36.47	49.86	13.68
23.98	29.32	13.32			6.28	16.10	8.98
					20.04	51.34	28.52
				14.30	28.61	36.65	20.43
22.57	22.57	14.30	12.04	13.94	10.77		
					34.41	52.69	12.90
21.11	25.33			10.67	11.56	18.67	10.44
21.88	21.88	16.41			7.37	19.34	10.82
					19.63	51.53	28.83
				15.32	28.94	35.74	20.00
26.14	26.14	14.70	10.32	13.76	6.88		
28.20	28.20	8.81			11.87	16.23	4.45
30.77	30.77			12.96	9.72	8.50	4.86
					36.47	49.86	13.68

Table 27 (continued)

	Jan.	Febr.	Mar.	Apr.
Perennial Forages (Con't.)				
Smooth Brome 240N-3SG				2.42
Smooth Brome 240N-H2G				
Smooth Brome 240N-H1G				
Switchgrass 60N-CC				
Tall Fescue 240N-3SG				1.97
Tall Fescue 240N-H2G				
Tall Fescue 240N-H1G				
Renovated Pasture				
Oats Harvested as Hay				
Oats Harvested as Grain or Silage				
Round Bale Grazing October	33.33		8.33	
Round Bale Grazing November	33.33		8.33	
Round Bale Grazing December	41.67	8.33	8.33	
Supplemental Pastures and Annual Crop Residues				
Cornstalks A-01	19.91			
Cornstalks A-02	21.01			
Cornstalks A-N1	24.07			
Cornstalks B-01	19.95			

May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
25.88	23.00	16.68			6.30	16.53	9.20
					19.66	51.61	28.73
				17.18	25.77	36.64	20.40
	14.88	28.67	28.67	27.76			
23.34	23.34	15.87			6.68	18.57	10.22
					18.84	52.35	28.81
				15.71	26.72	37.13	20.43
		26.03	32.88		21.92	19.18	
			44.44		29.63	25.93	
					8.33	16.67	33.33
						25.00	33.33
							41.67
					22.98	33.04	24.07
						45.95	33.04
						22.98	52.95
					23.04	33.02	23.99

Table 27 (continued)

Supplemental Pastures and Annual Crop Residues (Con't.)	Jan.	Febr.	Mar.	Apr.
Cornstalks B-02	20.90			
Cornstalks B-N1	23.99			
Cornstalks B-HF01	20.11			
Cornstalks B-HF02	20.95			
Cornstalks B-HSHN1	24.13			
Cornstalks B-HSHN2	43.02	11.05		
Forage Sorghum A-SPF	15.47	4.12	3.08	
Forage Sorghum A-HSG				
Forage Sorghum B-SPF	15.46	4.12	3.08	
Forage Sorghum B-HSG				
Grain Sorghum A-01	13.67	12.76		
Grain Sorghum A-02	21.98	12.98		
Grain Sorghum B-01	13.67	12.65		
Grain Sorghum B-02	21.90	13.04		
Sorghum Sudan A-AG				

May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
						46.08	33.02
						23.04	52.97
					22.91	32.96	24.02
						46.09	32.96
						22.96	52.91
							45.93
						40.22	37.11
						33.33	66.67
						40.23	37.12
						33.33	66.67
					20.05	39.86	13.67
						39.98	25.06
					20.13	39.87	13.67
						40.00	25.06
		29.96	34.89	29.52		5.64	

Table 27 (continued)

	Jan.	Febr.	Mar.	Apr.
Supplemental Pastures and Annual Crop Residues (Con't.)				
Sorghum Sudan A-SPF	7.92			
Sorghum Sudan B-AG				
Sorghum Sudan B-SPF	7.92			

May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
					23.76	48.51	19.80
		30.89	34.42	29.13		5.55	
					23.76	48.51	19.80

Table 28. Annual potential yields of perennial and supplemental forages under different forms of management[a]

Type of Forage and Management	Grazing DM Yield	Harvested DM Yield	Total DM Yield	Hay Equivalent Yield
Perennial Forages				
Alfalfa Grass[b]	6168.73	--	6168.73	
RGA	3.08	--	3.08	3.50
Alfalfa Grass	4240.00	2897.10	7137.10	
H1-G	2.12	1.45	3.57	4.06
Alfalfa Grass	2798.64	4350.46	7140.10	
H2-G	1.39	2.18	3.57	4.06
Alfalfa Grass	2798.64	4350.46	7140.10	
H2-SPF	1.39	2.18	3.57	4.06
Alfalfa Grass	1138.30	5568.69	6706.99	
H3-G	.57	2.78	3.35	3.81
Alfalfa Grass	1138.30	5568.69	6706.99	
H2-RBG	.57	2.78	3.35	3.81
Alfalfa Grass	1138.30	5568.69	6706.99	
H2-LRBG	.57	2.78	3.35	3.81
Alfalfa Grass	1959.68	--	1959.68	
RH	.98	--	.98	1.11
Alfalfa Grass	1451.61	--	1451.61	
RS and RG	.73	--	.73	.83
Birdsfoot Trefoil	4821.44	--	4821.44	
CG	2.41	--	2.41	2.65
Birdsfoot Trefoil	4599.98	--	4599.98	
SP1	2.30	--	2.30	2.53
Birdsfoot Trefoil	4459.98	--	4459.98	
SP2	2.23	--	2.23	2.45

[a]Source: Adopted from Kuhlmann (17).

[b]The first row of each forage is given in pounds, the second is given in tons.

Table 28 (continued)

Type of Forage and Management	Grazing DM Yield	Harvested DM Yield	Total DM Yield	Hay Equivalent Yield
Perennial Forages (Con't.)				
Birdsfoot Trefoil H1-SP2	2827.71 1.41	1946.57 .97	4771.28 2.39	2.63
Birdsfoot Trefoil H1-RBG	1214.36 .61	3064.62 1.53	4278.98 2.14	2.35
Birdsfoot Trefoil H1-LRBG	1214.36 .61	3064.62 1.53	4278.98 2.14	2.35
Birdsfoot Trefoil RH	1499.98 .75	-- --	1499.98 .75	.82
Birdsfoot Trefoil RS and RG	107.69 .55	-- --	107.69 .55	.60
Crown Vetch CG	62599.99 3.13	-- --	62599.99 3.13	3.56
Crown Vetch RH	2020.00 1.01	-- --	2020.00 1.01	1.15
Crown Vetch RS and RG	1490.07 .75	-- --	1490.07 .75	.85
Kentucky Bluegrass CG	2840.00 1.42	-- --	2840.00 1.42	1.60
Kentucky Bluegrass 60N-CG	5340.00 2.67	-- --	5340.00 2.67	3.00
Kentucky Bluegrass 60N-3S	5440.02 2.72	-- --	5440.02 2.72	3.06
Kentucky Bluegrass RH	1959.97 .98	-- --	1959.97 .98	1.10
Kentucky Bluegrass RS and RG	1446.95 .72	-- --	1446.95 .72	.81
Orchardgrass 120N-CG	5539.98 2.77	-- --	5539.98 2.77	3.14

Table 28 (continued)

Type of Forage and Management	Grazing DM Yield	Harvested DM Yield	Total DM Yield	Hay Equivalent Yield
Perennial Forages (Con't.)				
Orchardgrass	4779.98	--	4779.98	
120N-3SG	2.39	--	2.39	2.71
Orchardgrass	4380.00	--	4380.00	
120N-3SGE	2.19	--	2.19	2.48
Orchardgrass	1674.42	3626.15	5300.57	
120N-H2G	.84	1.81	2.65	3.00
Orchardgrass	1674.42	3626.15	5300.57	
120N-RB	.84	1.81	2.65	3.00
Orchardgrass	1674.42	3626.15	5300.57	
120N-LRB	.84	1.81	2.65	3.00
Orchardgrass	8380.48	--	8380.48	
240N-3SG	4.19	--	4.19	5.03
Orchardgrass	2845.04	6493.38	9338.42	
240N-H2G	1.42	3.25	4.67	5.29
Orchardgrass	4063.46	5180.99	9254.45	
240N-H1G	2.04	2.59	4.63	5.24
Orchardgrass	2845.04	6493.38	9338.42	
240N-RB	1.42	3.25	4.67	5.29
Orchardgrass	2845.04	6493.38	9338.42	
240N-LRB	1.42	3.25	4.67	5.29
Orchardgrass	1860.00	--	1860.00	
RH	.93	--	.93	1.05
Orchardgrass	1374.05	--	1374.05	
RS and RG	.69	--	.69	.78
Reed Canarygrass	6760.01	--	6760.01	
120N-CG	3.38	--	3.38	3.70
Reed Canarygrass	1976.28	5008.12	6984.81	
120N-H2G	.99	2.50	3.49	3.82

Table 28 (continued)

Type of Forage and Management	Grazing DM Yield	Harvested DM Yield	Total DM Yield	Hay Equivalent Yield
Perennial Forages (Con't.)				
Reed Canarygrass 120N-RB	1976.28 .99	5008.12 2.50	6984.81 3.49	3.82
Reed Canarygrass 120N-LRB	1976.28 .99	5008.12 2.50	6984.81 3.49	3.82
Reed Canarygrass 240N-3SGE	9404.39 4.70	-- --	9404.39 4.70	5.15
Reed Canarygrass 240N-3SG	9080.02 4.54	-- --	9080.02 4.54	4.97
Reed Canarygrass 240N-H2G	3600.00 1.80	6273.28 3.14	9873.28 4.94	5.41
Reed Canarygrass 240N-H1G	5178.92 2.59	5041.41 2.52	10220.33 5.11	5.60
Reed Canarygrass 240N-RB	3600.00 1.80	6273.28 3.14	9873.28 4.94	5.41
Reed Canarygrass 240N-LRB	3600.00 1.80	6273.28 3.14	9873.28 4.94	5.41
Reed Canarygrass RH	2020.00 1.01	-- --	2020.00 1.01	1.11
Reed Canarygrass RS and RG	1487.60 .74	-- --	1487.60 .74	.81
Smooth Brome 120N-CG	5459.87 2.73	-- --	5459.87 2.73	3.04
Smooth Brome 120N-3SG	4667.75 2.34	-- --	4667.75 2.34	2.62
Smooth Brome 120N-3SGE	4299.99 2.15	-- --	4299.99 2.15	2.40
Smooth Brome 120N-H2G	1640.00 .82	3580.87 1.79	5220.87 2.61	2.91

Table 28 (continued)

Type of Forage and Management	Grazing DM Yield	Harvested DM Yield	Total DM Yield	Hay Equivalent Yield
Perennial Forages (Con't.)				
Smooth Brome 120N-RB	1640.00 .82	3580.87 1.79	5220.87 2.61	2.91
Smooth Brome 120N-LRB	1640.00 .82	3580.87 1.79	5220.87 2.61	2.91
Smooth Brome 240N-3SG	7639.95 3.82	-- --	7639.95 3.82	4.26
Smooth Brome 240N-H2	2651.63 1.33	5904.76 2.95	8556.39 4.28	4.77
Smooth Brome 240N-H1	3734.34 1.87	4523.81 2.26	8258.15 4.13	4.60
Smooth Brome 240N-RB	2651.63 1.33	5904.76 2.95	8556.39 4.28	4.77
Smooth Brome 240N-LRB	2651.63 1.33	5904.76 2.95	8556.39 4.28	4.77
Smooth Brome RH	1820.00 .91	-- --	1820.00 .91	1.80
Smooth Brome RS and RG	1353.38 .68	-- --	1353.38 .68	.76
Switchgrass 60N-CG	6798.68 3.40	-- --	6798.68 3.40	3.86
Switchgrass RH	1720.00 .86	-- --	1720.00 .86	.98
Switchgrass RS and RG	960.00 .48	-- --	960.00 .48	.55
Tall Fescue 240N-3S	9914.53 4.96	-- --	9914.53 4.96	5.60
Tall Fescue 240N-H2	3947.47 1.97	7453.19 3.73	11400.66 5.70	6.44

Table 28 (continued)

Type of Forage and Management	Grazing DM Yield	Harvested DM Yield	Total DM Yield	Hay Equivalent Yield
Perennial Forages (Con't.)				
Tall Fescue 240N-H1	5564.74 2.78	5892.28 2.95	11457.02 5.73	6.47
Tall Fescue 240N-RB	3947.47 1.97	7453.19 3.73	11400.66 5.70	6.44
Tall Fescue 240N-LRB	3947.47 1.97	7453.19 3.73	11400.66 5.70	6.44
Tall Fescue RH	2339.74 1.17	-- --	2339.74 1.17	1.32
Tall Fescue RS and RG	1730.77 .87	-- --		
Supplemental Forages				
Corn Stalks A-CG	5200.00 2.60	-- --	5200.00 2.60	
Corn Stalks A-HF	-- --	2340.00 1.17	2340.00 1.17	
Corn Stalks A-HSH	-- --	2860.00 1.43	2860.00 1.43	
Corn Stalks B-CG	4807.29 2.40	-- --	4807.29 2.40	
Corn Stalks B-HF	4079.88 2.04	720.00 .36	4799.88 2.40	
Corn Stalks B-HSH	3920.00 1.96	880.00 .44	4800.00 2.40	
Forage Sorghum A-SPF	13500.00 6.75	-- --	13500.00 6.75	
Forage Sorghum A-HSC	1624.94 .81	8202.00 4.10	9827.55 4.91	

Table 28 (continued)

Type of Forage and Management	Grazing DM Yield	Harvested DM Yield	Total DM Yield	Hay Equivalent Yield
Supplemental Forages (Con't.)				
Forage Sorghum	12140.00	--	12140.00	
B-SPF	6.07	--	6.07	
Forage Sorghum	1468.30	7375.29	8843.59	
B-HSG	.73	3.69	4.42	
Grain Sorghum Stubble	4319.95	--	4319.95	
A-CG	2.16	--	2.16	
Grain Sorghum Stubble	3900.00	--	3900.00	
B-CG	1.95	--	1.95	
Sorghum Sudan	8160.14	--	8160.14	
A-AG	4.08	--	4.08	
Sorghum Sudan	8020.56	--	8020.56	
A-SPF	4.01	--	4.01	
Sorghum Sudan	7440.00	--	7440.00	
B-AG	3.72	--	3.72	
Sorghum Sudan	7218.57	--	7218.57	
B-SPF	3.61	--		

Table 29. Total digestible nutrient and digestible protein percentages on a dry matter basis assumed for feeds[a]

Feed	Pasture		Hay		Silage	
	Percent TDN	Percent DP	Percent TDN	Percent DP	Percent TDN	Percent DP
Birdsfoot Trefoil	75.0	16.1	61.0	10.7		
Oats	63.5	9.4	55.0	4.4	58.0	5.5
Alfalfa-Grass	62.0	15.0	57.0	12.2		
Smooth Brome	66.5	10.5	57.0	7.4		
Orchardgrass	65.5	11.5	57.0	6.5		
Reed Canarygrass	66.0	9.1	56.0	6.3		
Tall Fescue	58.0	10.1	53.0	6.8		
Kentucky Bluegrass	62.2	9.6				
Sorghum Sudan AG	66.5	6.6				
Sorghum Sudan SPF	63.0	6.3				
Forage Sorghum SPF	53.5	2.2				
Grain Sorghum Stubble	58.0	2.6				
Corn Stalks	58.5	2.8				
Crown Vetch	60.4	15.6				
Corn					70.0	4.9
Straw			52.0	1.4		
Switchgrass	50.0	8.0				
Forage Sorghum	55.6	2.3			55.5	2.5

[a]Source: National Academy of Sciences (28).

Table 30. Monthly distribution of total digestible nutrients and digestible protein for grazed forages used in our plan

Type of Forage and Management		Jan.	Febr.	Mar.	Apr.	May
Perennial Forages						
Alfalfa-Grass RGA	TDN					474.33
	DP					114.12
Alfalfa-Grass H1-G	TDN					
	DP					
Alfalfa-Grass H2-G	TDN					
	DP					
Alfalfa-Grass H2-SPF	TDN					
	DP					
Alfalfa-Grass H3-G	TDN					
	DP					
Alfalfa-Grass H2-RBGO	TDN	233.08		58.25		
	DP	56.08		14.02		
Alfalfa-Grass H2-RBGN	TDN	233.08		58.25		
	DP	56.08		14.02		
Alfalfa-Grass H2-RBGD	TDN	291.36	58.25	58.25		
	DP	70.10	14.02	14.02		
Alfalfa-Grass H2-LRBO	TDN	265.56		66.37		
	DP	63.84		15.96		
Alfalfa-Grass H2-LRBN	TDN	265.56		66.37		
	DP	63.84		15.96		
Alfalfa-Grass H2-LRBD	TDN	331.97	66.37	66.37		
	DP	79.81	16.96	15.96		
Alfalfa-Grass RH	TDN					
	DP					
Alfalfa-Grass RS and RG	TDN					
	DP					
Birdsfoot Trefoil CG	TDN					94.99
	DP					20.41
Birdsfoot Trefoil SP1	TDN					
	DP					

June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
607.14	474.32	399.43	159.77	367.48			2482.47
146.08	114.12	96.10	38.44	88.42			597.28
	533.79	449.50	160.54	433.45			1577.28
	128.42	108.15	38.62	104.29			379.48
		448.48	160.17	432.45			1041.10
		107.90	38.54	104.04			250.48
			608.64	432.45			104.09
			146.44	104.04			250.48
				432.45			432.45
				104.04			104.04
				58.25	116.57	233.07	699.22
				14.02	28.05	56.08	168.25
					174.82	233.07	699.22
					42.06	56.08	168.24
						291.36	699.22
						70.10	168.24
				66.37	132.82	265.56	796.68
				15.96	31.93	63.84	191.53
					199.17	265.56	796.66
					47.89	63.84	191.53
						331.97	796.68
						79.81	191.54
	189.77	239.71		159.81	139.71		729.00
	45.66	57.67		38.45	33.64		175.42
		240.00		160.00	140.00		540.00
		58.06		38.71	33.87		130.64
683.93	626.93	480.65	303.97	159.98			2350.45
146.98	134.73	103.29	65.32	34.38			505.11
361.40	855.95	512.57	304.34	208.23			2242.49
77.67	183.94	110.15	65.40	44.75			481.91

Table 30 (continued)

Type of Forage and Management		Jan.	Febr.	Mar.	Apr.	May
Perennial Forages (Con't.)						
Birdsfoot Trefoil	TDN				63.98	664.77
SP2	DP				13.74	142.86
Birdsfoot Trefoil	TDN					
H1-SP2	DP					
Birdsfoot Trefoil	TDN	287.21		71.78		
H1-RBO	DP	59.71		14.92		
Birdsfoot Trefoil	TDN	287.21		71.78		
H1-RBN	DP	59.71		14.92		
Birdsfoot Trefoil	TDN	359.03	71.78	71.78		
H1-RBD	DP	74.64	14.92	14.92		
Birdsfoot Trefoil	TDN	332.49		83.10		
H1-LRBO	DP	66.76		16.69		
Birdsfoot Trefoil	TDN	332.49		83.10		
H1-LRBN	DP	66.76		16.69		
Birdsfoot Trefoil	TDN	415.64	83.10	83.10		
H1-LRBD	DP	83.46	16.69	16.69		
Birdsfoot Trefoil	TDN					
RH	DP					
Birdsfoot Trefoil	TDN					
RS and RG	DP					
Crown Vetch	TDN					360.62
CG	DP					93.14
Crown Vetch	TDN					
RH	DP					
Crown Vetch	TDN					
RS and RG	DP					
Kentucky Bluegrass	TDN					303.68
CG	DP					47.02
Kentucky Bluegrass	TDN					493.23
60N-CG	DP					76.37

June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
	341.88	511.82	399.86	191.93			2174.24
	73.47	109.99	85.93	41.25			535.92
	304.55	480.88	400.73	192.35			1378.51
	65.45	103.34	86.12	41.34			296.25
				71.78	143.65	287.21	861.63
				14.92	29.86	59.71	179.12
					215.43	287.21	861.63
					44.79	59.71	179.13
						359.03	861.63
						74.64	179.12
				83.10	166.30	332.49	997.48
				16.69	33.39	66.76	200.29
					249.39	332.49	997.47
					50.08	66.76	200.29
						415.64	997.48
						83.46	200.30
	190.32	240.41		160.27	140.24		731.24
	40.90	51.66		34.44	30.14		157.14
		239.98		159.99	139.99		639.96
		51.51		34.34	30.05		115.90
721.25	531.44	415.56	239.75				2268.62
186.28	137.26	107.33	61.92				585.93
	190.54	240.67		160.45	140.39		732.05
	49.21	62.16		41.44	36.26		189.07
		239.99		159.99	139.99		539.97
		61.99		41.32	36.16		139.47
303.68	132.86	79.92	159.83	79.92			1059.89
47.02	20.57	12.37	24.75	12.37			164.10
569.11	227.64	95.85	303.53	303.53			1992.89
88.12	35.25	14.84	47.00	47.00			308.58

Table 30 (continued)

Type of Forage and Management		Jan.	Febr.	Mar.	Apr.	May
Perennial Forages (Con't.)						
Kentucky Bluegrass	TDN				48.01	570.10
60N-3S	DP				7.43	88.27
Kentucky Bluegrass	TDN					
RH	DP					
Kentucky Bluegrass	TDN					
RS and RG	DP					
Orchardgrass	TDN				47.92	607.05
120N-CG	DP				8.07	102.23
Orchardgrass	TDN				48.10	609.22
120N-3SG	DP				8.10	102.59
Orchardgrass	TDN				48.09	609.09
120N-3SGE	DP				8.09	102.57
Orchardgrass	TDN					
120N-H2	DP					
Orchardgrass	TDN	384.01		95.97		
120N-RBGD	DP	58.80		14.70		
Orchardgrass	TDN	384.01		95.97		
120N-RBGN	DP	58.80		14.70		
Orchardgrass	TDN	480.04	95.97	95.97		
120N-RBGD	DP	73.50	14.70	14.70		
Orchardgrass	TDN	438.79		109.66		
120N-LRBO	DP	65.23		16.30		
Orchardgrass	TDN	438.79		109.66		
120N-LRBN	DP	65.23		16.30		
Orchardgrass	TDN	548.51	109.66	109.66		
120N-LRBD	DP	81.54	16.30	16.30		
Orchardgrass	TDN				72.06	855.69
240N-3SG	DP				12.13	144.10
Orchardgrass	TDN					
240N-H2G	DP					

June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
665.12			480.09	240.05	196.03		2199.40
102.98			74.33	37.17	30.35		340.53
	190.38	240.48		160.32	140.28		731.46
	29.48	37.23		24.82	21.72		113.25
		240.00		160.00	140.00		540.00
		37.15		24.77	21.67		83.59
607.05	341.47	239.62	319.50	159.75			2322.36
102.23	57.50	40.35	53.80	26.90			391.08
609.22	190.38			256.51	350.70	96.19	2160.31
102.59	32.06			43.20	59.06	16.20	363.80
609.09			256.46	192.34	168.30	96.17	1979.54
201.57			43.19	32.39	28.34	16.20	333.39
				255.97	349.96	95.99	701.92
				43.11	58.93	16.16	118.20
				95.97	192.06	384.01	1152.02
				14.70	29.41	58.80	176.41
					288.04	384.01	1152.03
					44.10	58.80	176.40
						480.04	1152.02
						73.50	176.40
				109.66	219.46	438.79	1316.36
				16.30	32.62	65.23	195.68
					329.12	438.79	1316.36
					48.93	65.23	195.69
						548.51	1316.34
						81.54	195.68
1045.99	475.37			224.17	574.45	320.25	3567.99
176.14	80.05			37.75	96.74	53.93	600.84
				224.04	574.04	320.02	1118.10
				37.73	96.67	53.89	188.29

Table 30 (continued)

Type of Forage and Management		Jan.	Febr.	Mar.	Apr.	May
Perennial Forages (Con't.)						
Orchardgrass 240N-H1G	TDN					
	DP					
Orchardgrass 240N-RBGO	TDN	470.42		117.57		
	DP	72.03		18.00		
Orchardgrass 240N-RBGN	TDN	470.42		117.57		
	DP	72.03		18.00		
Orchardgrass 240N-RBGD	TDN	588.06	117.57	117.57		
	DP	90.04	18.00	18.00		
Orchardgrass 240N-LRBO	TDN	506.10		126.49		
	DP	75.23		18.80		
Orchardgrass 240N-LRBN	TDN	506.10		126.48		
	DP	75.23		18.80		
Orchardgrass 240N-LRBD	TDN	632.66	126.49	126.49		
	DP	94.05	18.80	18.80		
Orchardgrass RH	TDN					
	DP					
Orchardgrass RS and RG	TDN					
	DP					
Reed Canarygrass 120N-CG	TDN				95.96	569.74
	DP				12.72	75.52
Reed Canarygrass 120N-H2G	TDN					
	DP					
Reed Canarygrass 120N-RBGO	TDN	399.34		99.80		
	DP	52.93		13.23		
Reed Canarygrass 120N-RBGN	TDN	399.34		99.80		
	DP	52.93		13.23		
Reed Canarygrass 120N-RBGD	TDN	499.19	99.80	99.80		
	DP	66.17	13.23	13.23		
Reed Canarygrass 120N-LRBO	TDN	456.43		114.07		
	DP	59.71		14.92		

June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
			224.14	448.27	574.34	320.19	1596.94
			37.74	75.49	96.72	53.92	263.87
				117.57	235.28	470.42	1411.26
				18.00	36.03	72.03	216.09
					352.85	470.42	1411.26
					54.03	72.03	216.09
						588.06	1411.26
						90.04	216.08
				126.49	253.13	506.10	1518.31
				18.80	37.63	75.23	225.69
					379.61	506.10	1518.31
					56.43	75.23	225.69
						632.66	1518.31
						94.05	225.69
	190.26	240.32		160.21	140.19		730.98
	32.04	40.47		26.98	23.61		123.10
		239.99		159.99	140.00		539.80
		41.04		27.36	23.94		92.24
569.74	360.83	303.86	351.84	271.88			2523.85
75.52	47.83	40.28	46.63	36.04			334.54
				255.82	391.73	95.93	743.48
				33.91	51.92	12.72	98.55
				99.80	199.73	399.34	1198.01
				13.23	26.48	52.93	158.80
					299.53	399.34	1198.01
					39.70	52.93	158.79
						499.19	1197.98
						66.17	158.80
				114.07	228.28	456.43	1369.28
				14.92	29.87	59.71	179.13

Table 30 (continued)

Type of Forage and Management		Jan.	Febr.	Mar.	Apr.	May
Perennial Forages (Con't.)						
Reed Canarygrass	TDN	456.43		114.07		
120N-LRBN	DP	59.71		14.92		
Reed Canarygrass	TDN	570.57	114.07	114.07		
120N-LRBD	DP	74.64	14.92	14.92		
Reed Canarygrass	TDN				79.96	759.64
240N-3SGE	DP				11.37	108.01
Reed Canarygrass	TDN				80.04	760.40
240N-3SG	DP				11.38	108.12
Reed Canarygrass	TDN					
240N-H2G	DP					
Reed Canarygrass	TDN					
240N-H1G	DP					
Reed Canarygrass	TDN	529.36		132.30		
240N-RBGO	DP	70.16		17.54		
Reed Canarygrass	TDN	529.36		132.30		
240N-RBGN	DP	70.16		17.54		
Reed Canarygrass	TDN	661.73	132.30	132.30		
240N-RBGD	DP	87.71	17.54	17.54		
Reed Canarygrass	TDN	564.69		141.13		
240N-LRBO	DP	73.88		18.46		
Reed Canarygrass	TDN	564.69		141.13		
240N-LRBN	DP	73.88		18.46		
Reed Canarygrass	TDN	705.90	141.13	141.13		
240N-LRBD	DP	92.35	18.46	18.46		
Reed Canarygrass	TDN					
RH	DP					
Reed Canarygrass	TDN					
RS and RG	DP					
Smooth Brome	TDN				47.95	607.42
240N-OG	DP				7.57	95.91

June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
					342.36	456.43	1369.29
					44.79	59.71	179.13
						570.57	1369.28
						74.64	179.12
911.57			383.82	415.81	671.69	375.83	3598.32
129.61			54.57	59.12	95.50	53.44	511.02
760.40	570.30			256.13	672.35	376.21	3475.83
108.12	81.09			36.42	95.60	53.49	494.21
				256.55	673.44	376.81	1306.80
				36.48	95.75	53.58	185.81
			288.00	543.98	671.98	375.99	1879.95
			28.47	53.77	66.42	37.16	185.82
				132.30	264.76	529.36	1588.08
				17.54	35.09	70.16	210.49
					397.06	529.36	1588.08
					52.63	70.16	210.49
						661.73	1588.06
						87.71	210.50
				141.13	282.43	564.69	1694.05
				18.46	36.95	73.88	221.63
					423.55	564.69	1694.06
					55.41	73.88	221.63
						705.90	1694.06
						92.35	221.62
	190.85	241.07		160.71	140.63		733.26
	27.14	34.28		22.85	20.00		104.27
		240.00		160.00	140.00		540.00
		34.12		22.75	19.91		76.78
607.42	341.67	239.77	319.69	159.85			2323.72
95.91	53.95	37.86	50.48	25.24			366.92

Table 30 (continued)

Type of Forage and Management		Jan.	Febr.	Mar.	Apr.	May
Perennial Forages (Con't.)						
Smooth Brome	TDN				48.01	608.17
120N-3SG	DP				7.58	96.03
Smooth Brome	TDN				47.93	607.09
120N-3SGE	DP				7.57	95.86
Smooth Brome	TDN					
120N-H2G	DP					
Smooth Brome	TDN	352.65		88.13		
120N-RBO	DP	53.72		13.43		
Smooth Brome	TDN	352.65		88.13		
120N-RBN	DP	53.72		13.43		
Smooth Brome	TDN	440.84	88.13	88.13		
120N-RBGD	DP	67.13	13.43	13.43		
Smooth Brome	TDN	396.45		99.08		
120N-LRBO	DP	59.73		14.93		
Smooth Brome	TDN	396.45		99.08		
120N-LRBN	DP	59.73		14.93		
Smooth Brome	TDN	495.59	99.08	99.08		
120N-LRBD	DP	74.67	14.93	14.93		
Smooth Brome	TDN				79.96	854.58
240N-3SG	DP				12.63	134.94
Smooth Brome	TDN					
240N-H2	DP					
Smooth Brome	TDN					
240N-H1	DP					
Smooth Brome	TDN	463.37		115.81		
240N-RBGO	DP	70.59		17.64		
Smooth Brome	TDN	463.37		115.81		
240N-RBGN	DP	70.59		17.64		
Smooth Brome	TDN	579.24	115.81	115.81		
240N-RBGD	DP	88.24	17.64	17.64		

June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
608.17	175.25			256.07	350.10	96.03	2141.80
96.03	27.67			40.43	55.28	15.16	338.18
607.09			255.62	191.71	167.75	95.86	1973.05
95.86			40.36	30.27	26.49	15.14	311.55
				254.54	348.00	95.45	697.99
				40.19	54.95	15.07	110.21
				88.13	176.38	352.65	1057.94
				13.43	26.87	53.72	161.17
					264.51	352.65	1057.94
					40.29	53.72	161.16
						440.84	1057.94
						67.15	161.16
				99.08	198.28	396.45	1189.34
				14.93	29.87	59.73	179.19
					297.37	396.45	1189.35
					44.80	59.73	179.19
						495.59	1189.34
						74.67	179.20
759.63	550.73			207.89	545.73	303.85	3302.37
119.95	86.96			32.83	86.17	47.98	521.46
				208.09	546.23	304.13	1058.45
				32.86	86.25	48.02	167.13
			256.06	384.09	546.12	304.07	1490.34
			40.43	60.65	86.24	48.01	235.33
				115.81	231.75	463.37	1390.11
				17.64	35.30	70.59	211.76
					347.56	463.37	1390.11
					52.94	70.59	211.76
						579.24	1390.10
						88.24	211.76

Table 30 (continued)

Type of Forage and Management		Jan.	Febr.	Mar.	Apr.	May
Perennial Forages (Con't.)						
Smooth Brome	TDN	503.73		125.89		
240N-LREC	DP	75.90		18.97		
Smooth Brome	TDN	503.73		125.89		
240N-LRBN	DP	75.90		18.97		
Smooth Brome	TDN	629.69	125.89	125.89		
240N-LRBD	DP	94.88	18.97	18.97		
Smooth Brome	TDN					
RH	DP					
Smooth Brome	TDN					
RS and RG	DP					
Switchgrass	TDN					
60N-CG	DP					
Switchgrass	TDN					
RH	DP					
Switchgrass	TDN					
RS and RG	DP					
Tall Fescue	TDN				66.55	790.30
240N-3SG	DP				11.59	137.62
Tall Fescue	TDN					
240N-H2G	DP					
Tall Fescue	TDN					
240N-H1G	DP					
Tall Fescue	TDN	501.65		125.37		
240N-RBGO	DP	83.76		20.93		
Tall Fescue	TDN	501.65		125.37		
240N-RBGN	DP	83.76		20.93		
Tall Fescue	TDN	627.09	125.37	125.37		
240N-RBGD	DP	104.71	20.93	20.93		
Tall Fescue	TDN	543.16		135.75		
240N-LRBC	DP	89.59		22.39		

June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
				125.89	251.94	503.73	1511.18
				18.97	37.96	75.90	227.70
					377.83	503.73	1511.18
					56.93	75.90	227.70
						629.69	1511.16
						94.88	227.70
	189.01	238.74		159.16	139.27		726.18
	29.84	37.70		25.13	21.99		114.66
		240.00		160.00	140.00		540.00
		37.89		25.26	22.11		85.26
252.91	487.47	487.47	471.85				1699.67
40.46	77.98	77.98	75.48				271.90
	111.92	141.37		94.25	82.47		430.01
	17.90	22.61		15.08	13.19		68.78
		106.67		71.11	62.22		240.00
		17.07		11.38	9.95		38.40
790.30	537.40			231.25	628.91	346.07	3390.77
137.62	137.62			93.58	40.27	109.52	590.46
				224.26	623.31	342.99	1190.56
				39.05	108.54	59.73	207.32
			273.05	464.19	645.08	345.97	1737.29
			47.55	80.83	112.33	61.81	302.23
				125.37	250.90	501.65	1504.94
				20.93	41.89	83.76	251.29
					376.27	501.65	1504.94
					62.83	83.76	251.29
						627.09	1504.93
						104.71	251.29
				135.75	271.66	543.16	1629.47
				22.39	44.81	89.59	268.77

Table 30 (continued)

Type of Forage and Management		Jan.	Febr.	Mar.	Apr.	May
Perennial Forages (Con't.)						
Tall Fescue	TDN	543.15		135.75		
240N-LRBN	DP	89.59		22.39		
Tall Fescue	TDN	678.98	135.74	135.74		
240N-LRBD	DP	111.99	22.39	22.39		
Tall Fescue	TDN					
RH	DP					
Tall Fescue	TDN					
RS and RG	DP					
Annual Crops and Crop Refuse						
Cornstalks	TDN	90.87				
A-01	DP	4.35				
Cornstlks	TDN	95.85				
A-02	DP	4.59				
Cornstalks	TDN	109.83				
A-N1	DP	5.25				
Cornstalks	TDN	84.04				
B-01	DP	4.02				
Cornstalks	TDN	88.04				
B-02	DP	4.21				
Cornstalks	TDN	101.05				
B-N1	DP	4.84				
Cornstalks	TDN	72.00				
B-HF01	DP	3.44				
Cornstalks	TDN	75.00				
B-HF02	DP	3.59				
Cornstalks	TDN	147.98				
B-HSHN1	DP	7.08				
Cornstalks	TDN	147.98	38.01			
B-HSHN2	DP	7.08	1.82			

June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
					407.41	543.16	1629.47
					67.20	89.59	268.77
						678.98	1629.46
						111.99	168.76
	190.02	240.03		160.02	140.02		730.09
	33.09	41.80		27.86	24.38		127.13
		240.00		160.00	140.00		540.00
		41.79		27.86	24.38		94.03
				104.84	150.77	109.83	456.31
				5.02	7.21	5.26	21.84
					209.68	150.77	456.30
					10.03	7.21	21.83
					104.84	241.63	456.30
					5.02	11.56	21.84
				97.05	139.70	101.05	421.84
				4.64	6.68	4.84	20.18
					194.09	139.07	421.20
					9.29	6.65	20.15
					97.05	223.11	421.21
					4.64	10.68	20.16
				82.00	118.01	86.00	358.01
				3.92	5.65	4.12	17.13
					165.01	118.01	358.02
					7.90	5.65	17.14
					38.01	157.99	343.98
					1.82	7.56	16.46
						157.99	343.98
						7.56	16.46

Table 30 (continued)

Type of Forage and Management		Jan.	Febr.	Mar.	Apr.	May
Annual Crops and Crop Refuse (Con't.)						
Forage Sorghum A-SPF	TDN	447.00	119.00	89.00		
	DP	19.11	5.09	3.81		
Forage Sorghum B-SPF	TDN	401.97	107.01	80.03		
	DP	17.19	4.58	3.42		
Forage Sorghum A-HSG	TDN					
	DP					
Forage Sorghum B-HSG	TDN					
	DP					
Grain Sorghum A-01	TDN	119.86	111.87			
	DP	5.37	5.01			
Grain Sorghum A-02	TDN	192.77	113.86			
	DP	8.64	5.10			
Grain Sorghum B-01	TDN	108.23	100.22			
	DP	4.85	4.49			
Grain Sorghum B-02	TDN	173.37	103.22			
	DP	8.64	5.10			
Sorghum Sudan A-AG	TDN					
	DP					
Sorghum Sudan B-AG	TDN					
	DP					
Sorghum Sudan A-SPF	TDN	160.08				
	DP	16.06				
Sorghum Sudan B-SPF	TDN	144.11				
	DP	14.46				

June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
					1162.00	1072.00	2889.00
					49.69	45.84	123.24
					1044.94	964.01	2597.96
					44.68	41.22	111.09
					135.52	271.04	406.56
					5.80	11.59	17.39
					122.46	244.91	367.37
					5.24	10.47	15.71
				175.79	349.59	119.86	876.77
				7.88	15.67	5.37	39.30
					350.58	219.74	846.91
					15.72	9.85	39.31
				159.34	315.68	108.23	791.70
				7.14	14.15	4.85	35.48
					316.68	198.43	791.70
					14.20	8.90	35.50
	894.05	1041.23	881.09		168.20		2984.57
	89.70	104.47	88.40		16.88		299.45
	815.17	949.35	803.30		153.36		2721.18
	81.79	95.25	80.60		15.39		273.03
				480.25	980.50	400.21	2021.04
				48.19	98.38	40.15	202.78
				423.34	882.70	360.29	1819.08
				43.38	88.56	36.15	182.55

APPENDIX C: SUGGESTED COSTS AND TIME REQUIREMENTS FOR OPERATION OF MACHINERY

Table 31. Field time requirements and suggested fuel, oil, repair and miscellaneous variable costs[a]

Operation	Equipment Size	Suggested Fuel[b] Oil, Repair & Misc. Variable Cost/Acre	Field Time[c] Requirements Hours/Acre	Acre/Hour
Pre-emergence Operations				
Chop Stalks	6'	.46	.30	3.3
Spreak P & K	12'	.57	.17	5.9
	4 Ton Bulk Spreader	.28	.11	9.1
Disk Stalkground				
	12'	.42	.17	5.8
	14'	.41	.15	6.8
	16'	.37	.13	7.8
	18'	.37	.11	8.7
	20'	.37	.10	9.6
Disk Plowed Ground				
	12'	.50	.19	5.2
	14'	.50	.17	6.1
	16'	.46	.14	6.9
	18'	.46	.13	7.8
	20'	.45	.12	8.6

[a]Sources: Background information for use with Crop-Cpt System (34) and Bowers (6).

[b]Includes costs of repairs, fuel, lubrication, and oil for tractors and self propelled items; and repairs and lubrication for other items.

[c]Does not allow for travel time to the field and initial mounting or set-up time of equipment.

Table 31 (continued)

Operation	Equipment Size	Suggested Fuel Oil, Repair & Misc. Variable Cost/Acre	Field Time Requirements Hours/Acre	Field Time Requirements Acre/Hour
Pre-emergence Operations (Con't.)				
Plow Cornstalk and Bean Ground	3-16"	1.61	.65	1.5
	4-16"	1.57	.50	2.0
	5-16"	1.47	.39	2.6
	6-16"	1.41	.33	3.1
	7-16"	1.40	.28	3.6
Plow Pasture, Hay or Cat Ground	3-16"	1.91	.72	1.4
	4-16"	1.86	.55	1.8
	5-16"	1.72	.45	2.2
	6-16"	1.62	.36	2.8
	7-16"	1.62	.31	3.3
Chisel Plow	9'	1.13	.29	3.5
	12'	1.08	.23	4.3
	16'	1.01	.19	5.3
NH_3 Application	5 Knife	.60	.20	5.0
	7 Knife	.58	.13	7.7
	9 Knife	.57	.12	8.3
Planting Corn and Grain Sorghum	4-38"	.58	.22	4.6
	6-30"	.61	.21	4.8
	8-30"	.60	.17	5.9
	12-30"	.58	.12	8.3

Table 31 (continued)

Operations	Equipment Size	Suggested Fuel Oil, Repair & Misc. Variable Cost/Acre	Field Time Requirements Hours/Acre	Acre/Hour
Pre-emergence Operations (Con't.)				
Planting Soybeans and Forage Sorghum	4-38"	.58	.21	4.8
	6-30"	.61	.21	5.0
	8-30"	.60	.16	6.2
	12-30"	.58	.11	9.1
Oat Seeding				
Drill (with fertilizer)	12-7"	.68	.52	1.94
	14-7"	.59	.44	2.26
	16-7"	.55	.38	2.66
	18-7"	.52	.33	2.99
	20-7"	.50	.29	3.42
	24-7"	.42	.24	4.10
Grass Seeding				
	12-7"	.59	.45	2.21
	14-7"	.52	.39	2.57
	16-7"	.51	.33	3.02
	18-7"	.45	.29	3.40
	20-7"	.44	.26	3.87
	24-7"	.39	.22	4.65
Harrow-Spike Tooth				
	20'	.26	.11	9.1
	30'	.23	.08	12.5
Harrow-Spring Tooth				
	14'	.40	.15	6.7
	20'	.35	.11	9.1

Table 31 (continued)

Operation	Equipment Size	Suggested Fuel Oil, Repair & Misc. Variable Cost/Acre	Field Time Requirements Hours/Acre	Field Time Requirements Acre/Hour
Post-emergence Operations				
Rotary Hoe				
	4-38"	.28	.11	9.1
	6-30"	.27	.10	10.0
	8-30"	.26	.08	12.5
	12-30"	.23	.06	16.7
Cultivation				
	4-38"	.57	.20	5.0
	6-30"	.57	.20	5.0
	8-30"	.57	.17	5.9
	12-30"	.57	.14	7.1
Grain Harvesting				
Corn				
	2-38" header	3.00	.60	1.7
	4-38" header	2.77	.35	2.9
	3-30" header	2.92	.56	1.8
	4-30" header	2.86	.47	2.1
	6-30" header	2.70	.34	2.9
Small Grain and Soybeans				
	12' platform	1.63	.47	2.1
	14' platform	1.61	.44	2.3
	16' platform	1.57	.40	2.5
	18' platform	1.55	.37	2.7
	24' platform	1.48	.28	3.6

Table 31 (continued)

Operation	Equipment Size	Suggested Fuel Oil, Repair & Misc. Variable Cost/Acre	Field Time Requirements Hours/Acre	Field Time Requirements Acre/Hour
Grain Harvesting (Con't.)				
Drying Corn and Sorghum		.006 per 1% moisture per bu.		
Hauling Grain (to farm storage)		.010/bu.	Use combine time as guide	
Forage Harvesting				
Mow	7' bar	.55	.33	3.0
Condition	--	.51	.30	3.3
Mow-condition	7' bar	.83	.34	2.9
Rake	--	.51	.29	3.4
Windrow (self-propelled)				
Small Grains	12'	.60	.21	4.86
	14'	.60	.18	5.67
Hay	12'	.71	.22	4.54
	14'	.71	.19	5.29
Baling Hay (145 bales or 4 ton)	PTO Baler	8.00 or 5.5¢/bale	.20 hr/T	5.0 ton or 1.3 A.
Baling Straw (40 bales or 3/4 ton)	PTO Baler	2.20 or 5.5¢/bale	.36 hr/T	2.78 ton or 3.7 A.
Hauling Bales (to farm storage)		0.01/bale	Use baling time as guide	

Table 31 (continued)

Operation	Equipment Size	Suggested Fuel Oil, Repair & Misc. Variable Cost/Acre	Field Time Requirements Hours/Acre	Acre/Hour
Chopping				
Corn and Sorghum	PTO Chopper 1-row	.31/T	.09 hr/T	
	PTO Chopper 2-row	.21/T	.06 hr/T	
	Self-propelled 2-row	.23/T	.05 hr/T	
	Self-propelled 3-row	.17/T	.04 hr/T	
Hay and Oats	PTO Chopper 1-row unit	.52/T	.12 hr/T	
	PTO Chopper 2-row unit	.31/T	.09 hr/T	
	Self-propelled 2-row unit	.37/T	.06 hr/T	
	Self-propelled 3-row unit	.26/T	.04 hr/T	
Fail Chopper		2.40	.75	.84
Blower (without recutter)	Hopper	.08/T	.04 hr/T	
	Conveyor	.10/T	.04 hr/T	
Silage Hauling		.16/T	Use chopping time as guide	

APPENDIX D: INPUT FORMS FOR INDIVIDUAL PRODUCER UTILIZATION OF MODEL

Crop and Beef Production Worksheets

for

Name _____

Address _____

Date _____

Section 1. General Information

A. Land Base of the farm. Includes both owned and rented land.

	Our Plan	Your Plan
1. Acres that can be continuously row cropped (Class A)	50/A.	_____/A.
2. Maximum Class A acres that can be placed in soybeans each year	25/A.	_____/A.
3. Estimated cash rent for Class A	40/A.	_____/A.
4. Acres that must be placed in a rotation (Class B)	375/A.	_____/A.
5. Maximum acres of Class B that can be placed in row crops	125/A.	_____/A.
6. Maximum acres of Class B that can be placed in soybeans each year	65/A.	_____/A.
7. Estimated cash rent for Class B	25/A.	_____/A.
8. Acres that must be kept in improved permanent pasture (Class C)	75/A.	_____/A.
9. Estimated cash rent for Class C	15/A.	_____/A.
B. Fixed Facilities		
1. Silo capacity (in terms of corn silage)	150/T.	_____/T.
2. Shelter for beef cows	1000/Head	____/Head
C. Size of beef herd that must be maintained	50/Head	____/Head

Section 2. Annual Crop Yield Expectations -- Expected yields should consider normal weather conditions.

The yields should represent the average of owned and rented land for each land class. It is assumed that yields of oat grain, oat hay, oat silage and straw will be the same on Class A and Class B Land.

Our Plan

	Class A		Class B		Class C	
Corn Grain	110	Bu/A	100	Bu/A	--	Bu/A
Corn Silage	17	Ton/A	15.3	Ton/A	--	Ton/A
Soybeans	35	Bu/A	33	Bu/A	--	Bu/A
Grain Sorghum	110	Bu/A	100	Bu/A	--	Bu/A
Oats	--	Bu/A	60	Bu/A	55	Bu/A
Oat Silage	--	Ton/A	6.11	Ton/A	5.6	Ton/A
Oat Hay	--	Ton/A	1.03	Ton/A	.93	Ton/A
Straw	--	Ton/A	.8	Ton/A	.6	Ton/A
Forage Sorghum Silage	15.00	Ton/A	13.5	Ton/A	--	Ton/A

Your Plan

Corn Grain		Bu/A		Bu/A	--	Bu/A
Corn Silage		Ton/A		Ton/A	--	Ton/A
Soybeans		Bu/A		Bu/A	--	Bu/A
Grain Sorghum		Bu/A		Bu/A	--	Bu/A
Oats	--	Bu/A		Bu/A		Bu/A
Cat Silage	--	Ton/A		Ton/A		Ton/A
Oat Hay	--	Ton/A		Ton/A		Ton/A
Straw	--	Ton/A		Ton/A		Ton/A
Forage Sorghum Silage		Ton/A		Ton/A	--	Ton/A

Section 3. Crop Residues and Supplemental Pasture Yields

The crop residues and supplemental pastures in our model are listed below.

The yields given are in terms of total available dry matter. Those yields enclosed in **parentheses,** ( ), approximate field moisture yields. Place the yield you wish to have considered in your model in the column headed "Your Plan Total Dry Matter Available". If you do not wish to consider an alternative in our plan, enter a yield of zero.

Crop and Management	Class	Our Plan Total Dry Matter Available Ton/Acre	Your Plan Total Dry Matter Available Ton/Acre
1. **Cornstalks** Continuous Graze	A	2.60 (4.00)	———
2. **Cornstalks** Flail Chop-Ensile	A	2.60 (4.33)	———
3. **Cornstalks** StakHand Harvest	A	2.60 (3.96)	———
4. **Cornstalks** Continuous Graze	B	2.40 (3.69)	———
5. **Cornstalks** Flail Chop-Ensile	B	2.40 (4.00)	———
6. **Cornstalks** StakHand Harvest	B	2.40 (3.65)	———
7. Forage Sorghum Stockpile Fall	A	6.75 (17.22)	———
8. Forage Sorghum Stockpile Fall	B	6.07 (15.04)	———
9. Forage Sorghum Silage-Graze	A	.83 (2.81)	———
10. Forage Sorghum Silage-Graze	B	.75 (2.54)	———
11. Grain Sorghum Stubble Continuous Graze	A	2.16 (2.70)	———
12. Grain Sorghum Stubble Continuous Graze	B	1.95 (2.70)	———
13. Sorghum Sudan Alternate Graze	A	4.08 (13.60)	———
14. Sorghum Sudan Alternate Graze	B	3.72 (14.88)	———

Crop and Management	Class	Our Plan Total Dry Matter Available Ton/Acre	Your Plan Total Dry Matter Available Ton/Acre
15. Sorghum Sudan Stockpile Fall	A	4.01 (13.37)	____
16. Sorghum Sudan Stockpile Fall	B	3.61 (14.44)	____

Section 4. Perennial Forage Yields

The perennial forages and their managements considered in our plan and the total dry matter available, are listed below. Place the number of those alternatives that you do not wish to consider in the column headed, "Delete From Our Plan". To adjust the yields respond with the appropriate answer to the two questions at the end of the list in Section 7.

Crop and Management	Our Plan Yield Ton D.M./Acre	Hay Equivalent	Delete From Our Plan
A. Varieties and managements available on Class B Land			
1. Alfalfa-Grass Rotational Graze	3.08	3.50	____
2. Alfalfa-Grass Harvest 1, Graze	3.57	4.06	____
3. Alfalfa-Grass Harvest 2, Graze	3.57	4.06	____
4. Alfalfa-Grass Harvest 2, Stockpile for fall grazing	3.57	4.06	____
5. Alfalfa-Grass Harvest 3, Graze	3.35	3.81	____
6. Birdsfoot Trefoil Continuous Graze	2.41	2.65	____
7. Birdsfoot Trefoil Stockpile Early Summer	2.30	2.53	____

Crop and Management	Our Plan Yield Ton D.M./Acre	Hay Equivalent	Delete From Our Plan
8. Birdsfoot Trefoil Stockpile Late Summer	2.23	2.45	___
9. Birdsfoot Trefoil Harvest 1, Stockpile Late Summer	2.39	2.63	___
10. Orchardgrass Continuous Graze, 120 lbs. N/A	2.77	3.14	___
11. Orchardgrass 3-Season Graze, 120 lbs. N/A	2.39	2.71	___
12. Orchardgrass 3-Season Graze Early, 120 lbs. N/A	2.19	2.48	___
13. Orchardgrass Harvest 2, 120 lbs. N/A	2.65	3.00	___
14. Orchardgrass 3-Season Graze, 240 lbs. N/A	4.19	5.03	___
15. Orchardgrass Harvest 2, Graze 240 lbs. N/A	4.67	5.29	___
16. Orchardgrass Harvest 1, Graze Early 240 lbs. N/A	4.63	5.24	___
17. Reed Canarygrass Continuous Graze, 120 lbs. N/A	3.38	3.70	___
18. Reed Canarygrass Harvest 2, Graze 120 lbs. N/A	3.49	3.82	___
19. Reed Canarygrass Harvest 1, Round Bale 2 120 lbs. N/A	3.49	3.82	___
20. Reed Canarygrass 3-Season Graze Early 240 lbs. N/A	4.70	5.15	___
21. Reed Canarygrass 3-Season Graze, 240 lbs. N/A	4.54	4.97	___

Crop and Management	Our Plan Yield Ton D.M./Acre	Hay Equivalent	Delete From Our Plan
22. Reed Canarygrass Harvest 2, Graze 240 lbs. N/A	4.94	5.41	___
23. Reed Canarygrass Harvest 1, Graze 240 lbs. N/A	5.11	5.60	___
24. Smooth Brome Continuous Graze, 120 lbs. N/A	2.73	3.04	___
25. Smooth Brome 3-Season Graze, 120 lbs. N/A	2.34	2.62	___
26. Smooth Brome 3-Season Graze Early 120 lbs. N/A	2.15	2.40	___
27. Smooth Brome Harvest 2, Graze 120 lbs. N/A	2.61	2.91	___
28. Smooth Brome 3-Season Graze, 240 lbs. N/A	3.82	4.26	___
29. Smooth Brome Harvest 2, Graze 240 lbs. N/A	4.28	4.59	___
30. Smooth Brome Harvest 1, Graze 240 lbs. N/A	4.13	4.60	___
31. Switchgrass Continuous Graze, 60 lbs. N/A	3.40	3.86	___
32. Tall Fescue 3-Season Graze, 240 lbs. N/A	4.95	5.59	___
33. Tall Fescue Harvest 2, Graze 240 lbs. N/A	5.70	6.44	___
34. Tall Fescue Harvest 1, Graze 240 lbs. N/A	5.73	6.47	___
B. Varieties and Managements Available on Class C Land			
35. Birdsfoot Trefoil Continuous Graze	2.41	2.65	___

Crop and Management	Our Plan Yield Ton D.M./Acre	Hay Equivalent	Delete From Our Plan
36. Birdsfoot Trefoil Stockpile Early Summer	2.30	2.53	___
37. Birdsfoot Trefoil Stockpile Late Summer	2.23	2.45	___
38. Birdsfoot Trefoil Harvest 1, Stockpile Late Summer	2.39	2.63	___
39. Crown Vetch Continuous Graze	3.13	3.56	___
40. Kentucky Bluegrass Continuous Graze	1.42	1.60	___
41. Kentucky Bluegrass Continuous Graze, 60 lbs. N/A	2.67	3.00	___
42. Kentucky Bluegrass 3-Season Graze, 60 lbs. N/A	2.72	3.06	___
Section 5. Grazing During Renovation Year			
A. Class B Land; Oats harvested as grain			
1. Alfalfa-Grass	.73	.83	___
2. Birdsfoot Trefoil	.55	.60	___
3. Orchardgrass	.69	.78	___
4. Reed Canarygrass	.74	.81	___
5. Smooth Brome	.68	.76	___
6. Switch Grass	.48	.55	___
7. Tall Fescue	.87	.98	___
B. Class B Land: Oats harvested as silage			
8. Alfalfa-Grass	.73	.83	___
9. Birdsfoot Trefoil	.55	.60	___

Crop and Management	Our Plan Yield Ton D.M./Acre	Hay Equivalent	Delete From Our Plan
10. Orchardgrass	.69	.79	___
11. Reed Canarygrass	.74	.81	___
12. Smooth Brome	.69	.76	___
13. Switch Grass	.49	.55	___
14. Tall Fescue	.87	.99	___
C. Class B Land: Oats harvested as hay			
15. Alfalfa Grass	.99	1.11	___
16. Birdsfoot Trefoil	.95	.82	___
17. Orchardgrass	.93	1.05	___
18. Reed Canarygrass	1.01	1.11	___
19. Smooth Brome	.91	1.08	___
20. Switch Grass	.86	.99	___
21. Tall Fescue	1.17	1.32	___
D. Class C Land: Oats harvested as grain			
22. Birdsfoot Trefoil	.55	.60	___
23. Crown Vetch	.75	.85	___
24. Kentucky Bluegrass	.92	.81	___
E. Class C Land: Oats harvested as silage			
25. Birdsfoot Trefoil	.55	.82	___
26. Crown Vetch	.75	.85	___
27. Kentucky Bluegrass	.72	.81	___

Crop and Management	Our Plan Yield Ton D.M./Acre	Hay Equivalent	Delete From Our Plan
F. Class C. Land: Oats harvested as hay			
28. Birdsfoot Trefoil	.75	.[illegible]	___
29. Crown Vetch	1.01	1.1[illegible]	___
30. Kentucky Bluegrass	.[illegible]	1.1[illegible]	___
Section 6. Harvesting Last Cutting as Small Round Bales and Grazing in Fall			
1. Alfalfa-Grass Harvest 2, Round Bale 3	3.11	3.53	___
2. Orchardgrass Harvest 1, Round Bale 2 120 lbs. N/A	2.65	3.00	___
3. Orchardgrass Harvest 1, Round Bale 2 240 lbs. N/A	4.67	5.29	___
4. Reed Canarygrass Harvest 1, Round Bale 2 120 lbs. N/A	3.49	3.[illegible]	___
5. Reed Canarygrass Harvest 1, Round Bale 2 240 lbs. N/A	4.[illegible]	5.41	___
6. Smooth Brome Harvest 1, Round Bale 2 120 lbs. N/A	2.61	2.91	___
7. Smooth Brome Harvest 1, Round Bale 2 240 lbs. N/A	4.[illegible]	4.77	___
8. Tall Fescue Harvest 1, Round Bale 2 240 lbs. N/A	5.70	6.[illegible]	___

Crop and Management	Our Plan Yield Ton D.M./Acre	May Equivalent	Delete From Our Plan
9. Birdsfoot Trefoil[1] Harvest 1, Round Bale 2	2.14	2.35	___
Section 7. Harvesting Last Cutting as Large Round Bales and Grazing in Fall			
1. Alfalfa-Grass Harvest 2, Round Bale 3	3.11	3.53	___
2. Orchardgrass Harvest 1, Round Bale 2 120 lbs. N/A	2.65	3.00	___
3. Orchardgrass Harvest 1, Round Bale 2 240 lbs. N/A	4.67	5.29	___
4. Reed Canarygrass Harvest 1, Round Bale 2 120 lbs. N/A	3.49	3.82	___
5. Reed Canarygrass Harvest 1, Round Bale 2 240 lbs. N/A	4.94	5.41	___
6. Smooth Brome Harvest 1, Round Bale 2 120 lbs. N/A	2.61	2.91	___
7. Smooth Brome Harvest 1, Round Bale 2 240 lbs. N/A	4.28	4.77	___
8. Tall Fescue Harvest 1, Round Bale 2 240 lbs. N/A	5.70	6.44	___
9. Birdsfoot Trefoil[1] Harvest 2, Round Bale 2	2.14	2.35	___

In order to accurately reflect the yields on my farm, the total dry matter yields of all the perennial forages should be _____.

1 = Decreased; 2 = Left the Same; 3 = Increased

By what percent do you wish to alter these yields? _____%

[1]Birdsfoot Trefoil is harvested as round bales on both Class B & C land.

Section 8. Price Expectation (Net at the Farm).

	Our Plan	Your Plan
Corn	$ 1.87 /Bu.	_____ /Bu.
Grain Sorghum	1.68 /Bu.	_____ /Bu.
Soybeans	5.30 /Bu.	_____ /Bu.
Oats	1.00 /Bu.	_____ /Bu.
Straw	30.00 /Ton.	_____ /Ton.
Feeder Steers	45.00 /Cwt.	_____ /Cwt.
Feeder Heifers	41.00 /Cwt.	_____ /Cwt.
Cull Cows	250.00 /Heifer	_____ /Heifer
Purchased Replacement Heifers	375.00 /Heifer	_____ /Heifer
Rate of return on investment desired	7% /Year	_____ /Year

Section 9. Variable Costs and Field Time Requirements for Annual Crops.

A. Corn - Variable Cost and Field Time Requirements: Class A Land

	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Field Preparation (Fall or Spring)				
Chop Stalks	$ .57	$	.17 hrs.	hrs.
Spread P and K	.28		.11	
Plow	1.57		.50	
Subtotal	$2.42	(1)$	.78 hrs.	(5) hrs.
Field Preparation (Spring Only)				
Disk	$ .50	$	.17 hrs.	hrs.
Apply N	.58		.18	
Subtotal	$1.08	(2)$	.35 hrs.	(6) hrs.[1]
Planting Operations				
Disk	$ .50	$	.17 hrs.	hrs.
Plant[2]	.61		.21	(7)
Subtotal	$1.11	(3)$	.38 hrs.	(8) hrs.
Weed Control				
Harrow	$ .26	$	.08 hrs.	(9) hrs.
Rotary Hoe (1 1/2 x)	.40		.15	(10)
Cultivate (1 1/2 x)	.85		.30	(11)
Subtotal	$1.51	(4)$	.53 hrs.	hrs.

[1]Item should include only the labor required from the fixed labor supply. Do not include the labor required of a custom operator or hired because job required more than one man.

[2]Herbicide and insecticide applied with planter attachment in our plan.

Section 2 Corn (continued)	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Harvest-Grain, Class A				
Combine	$2.92	$_____	.56 hrs.	(16)_____ hrs.
Haul	1.10	_____	.31	(17)_____
_____	____	____	____	____
Subtotal	$4.02	(12)$_____	1.07 hrs.	(18)_____ hrs.[1]
Harvest-Grain, Class B				
Will these costs and field time requirements be the same as those used on Class A Land? (Yes - 1.0; No - 2.0)				(19)_____
Combine	$2.80	$_____	.52 hrs.	(20)_____ hrs.
Haul	1.00	_____	.46	(21)_____
_____	____	____	____	____
Subtotal	$3.80	(13)$_____	1.00 hrs.	(22)_____ hrs.[1]
Drying cost per 10 point's moisture removed	$.06/bu.	(14)$_____/bu.		
Harvest-Silage, Class A				
Chop	$3.57	$_____	.85 hrs.	(23)_____ hrs.
Haul and store	4.08	_____	1.0	(24)_____
Hired labor for harvesting silage[2]	____	_____	2.97	(25)_____
_____	____	____	____	____
Subtotal	$7.65	(15)$_____	.85 hrs.	(26)_____ hrs.[1]

[1]Item should include only the labor required from the fixed labor supply. Do not include the labor required of a custom operator or hired labor because job required more than one man.

[2]Hours of labor needed other than custom operator and/or fixed labor supply because silage harvesting is considered to be at least a two-man job.

Section 2 Corn (continued)	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Harvest-Silage, Class A				
Will these costs and field time requirements be the same as those used on Class A Land? (Yes - 1.0; No - 2.0)				(28)____
Chop	$3.21	$____	.70 hrs.	(29)____ hrs.
Haul and store	3.67	____	0.0	(30)____
Hired labor for harvesting silage[2]	____	____	2.31	(31)____
Subtotal	$6.88	(27)$____	.70 hrs.	(32)____ hrs.[1]
Custom Hire, Class A and B				
Field preparation	$0.00	(33)$____		
Planting and weed control	0.00	(34)____		
Harvest grain	0.00	(35)____		
Harvest silage	0.00	(36)____		
Other Variable Costs, Class A				
Seed	$9.00	(37)$____		
Fertilizer and lime	28.00	(38)____		
Herbicide	7.00	(39)____		
Insecticide	3.00	(40)____		
Crop Insurance	3.00	(41)____		
Miscellaneous	.25	(42)____		
Other Variable Costs, Class B				
Will these costs be the same as those used on Class A Land? (Yes - 1.0; No - 2.0)		(43)____		
Seed	$8.00	(44)$____		
Fertilizer and lime	25.00	(45)____		
Herbicide	7.00	(46)____		
Insecticide	3.00	(47)____		
Crop Insurance	3.00	(48)____		
Miscellaneous	.25	(49)____		

[1]Item should include only the labor required from the fixed labor supply. Do not include the labor required of a custom operator or hired labor because job required more than one man.

[2]Hours of labor needed other than custom operator and/or fixed labor supply because silage harvesting is considered to be at least a two-man job.

B. Soybeans - Variable Cost and Field Time Requirements

		Cost Per Acre		Hours Per Acre			
		Our Plan	Your Plan	Our Plan		Your Plan	
Field Preparation (Fall or Spring)							
Chop stalks		$ .57	$_____	____	hrs.	_____	hrs.
Spread P and K		.28	_____	____		_____	
Plow		1.57	_____	____		_____	
_____		____	____	____		____	
Subtotal		$2.42	$_____	____	hrs.	_____	hrs.
Field Preparation (Spring Only)							
_____		$____	$_____	____	hrs.	_____	hrs.
_____		____	_____	____		_____	
_____		____	____	____		____	
Subtotal		$0.0	(1) $_____	0.0	hrs.	(5) _____	hrs.
Planting Operations							
Disk	(2x)	$1.00	$_____	.34	hrs.	_____	hrs.
Plant[1]		.61	_____	.20		(6) _____	
_____		____	____	____		____	
Subtotal		$1.61	(2) $_____	.54	hrs.	(7) _____	hrs.
Weed Control							
Harrow		$ .23	$_____	.08	hrs.	(8) _____	hrs.
Rotary Hoe	(2x)	.70	_____	.20		(9) _____	
Cultivation	(2x)	1.14	_____	.40		(10) _____	
_____		____	____	____		____	
Subtotal		$2.07	(3) $_____	.68	hrs.	_____	hrs.
Harvest, Class A							
Combine		$1.57	$_____	.40	hrs.	(11) _____	hrs.
Haul		.35	_____	.35		(12) _____	
_____		____	____	____		____	
Subtotal		$1.92	(4) $_____	.75	hrs.	(13) _____	hrs.[2]

[1]Herbicide applied with planter attachment in our plan

[2]Item should include only the labor required from the fixed labor supply. Do not include the labor required of the custom operator or hired because job required more than one man.

Soybeans (continued)	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Harvest, Class B				
Will these costs and field time requirements be the same as those used for Class A land? (Yes - 1.0; No - 2.0)				(31)____
Combine	$1.57	$____	.38 hrs.	(32)____ hrs.
Haul	.33	____	.33	(33)____
Subtotal	$1.90	(14)$____	.71 hrs.	(34)____ hrs.[1]
Custom Hire Costs, Class A and B				
Field preparation	$0.00	(15)$____		
Planting and weed control	0.00	(16)____		
Harvest	0.00	(17)____		
Other Variable Costs, Class A				
Seed	$8.00	(18)$____		
Fertilizer and lime	10.00	(19)____		
Herbicide	7.00	(20)____		
Insecticide	0.00	(21)____		
Crop Insurance	4.00	(22)____		
Miscellaneous	.25	(23)____		
Other Variable Costs, Class B				
Will these costs be the same as on Class A land? (Yes - 1.0; No - 2.0)		(24)____		
Seed	$8.00	(25)$____		
Fertilizer and lime	8.00	(26)____		
Herbicide	6.00	(27)____		
Insecticide	0.00	(28)____		
Crop Insurance	3.00	(29)____		
Miscellaneous	.25	(30)____		

[1]Item should include only the labor required from the fixed labor supply. Do not include the labor required of the custom operator or hired because job required more than one man.

C. Grain Sorghum Variable Cost and Field Time Requirements, Class A Land

	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Field Preparation (Fall or Spring)				
Chop Stalks	$ .57	$_____	.17 hrs.	_____ hrs.
Spreak P and K	.28	_____	.11	_____
Plow	1.57	_____	.50	_____
_____	___	___	___	___
Subtotal	$2.42	$_____	.78 hrs.	_____ hrs.
Field Preparation (Spring only)				
Disk	$ .50	$_____	.17 hrs.	_____
Apply N	.58	_____	.18	_____
_____	___	___	___	___
Subtotal	$1.08	(1) $_____	.35 hrs.	(4) _____ hrs.
Planting Operations				
Disk	$ .50	$_____	.17 hrs.	_____ hrs.
Plant[1]	.61	_____	.21	(5) _____
_____	___	___	___	___
Subtotal	$1.11	(2) $_____	.38 hrs.	(6) _____ hrs.
Weed Control				
Harrow	$ .26	$_____	.08 hrs.	(7) _____ hrs.
Rotary Hoe (1 1x)	.40	_____	.15	(8) _____
Cultivation (1 1/2x)	.85	_____	.30	(9) _____
_____	___	___	___	___
Subtotal	$1.51	(3) $_____	.52 hrs.	_____ hrs.

[1]Herbicide and insecticide applied with planter attachment in our plan.

Grain Sorghum (continued)	Cost Per Acre			Hours Per Acre		
	Our Plan		Your Plan	Our Plan		Your Plan
Harvest Class A						
Combine	$2.32		$_____	.56 hrs.	(22)	_____ hrs.
Haul (0.008/bu.)	1.10		_____	.51	(23)	_____
Combining and hauling	$3.42	(10)	$_____	1.07 hrs.	(24)	_____ hrs.[1]
Harvest-Grain, Class B						
Will these costs and field time requirements be the same as those used for Class A land? (Yes - 1.0; No - 2.0)					(25)	_____
Combine	$2.32		$_____	.52 hrs.	(26)	_____ hrs.
Haul (0.008/bu.)	1.00		_____	.48	(27)	_____
Combining and Hauling	$3.32	(11)	$_____	1.00 hrs.	(28)	_____ hrs.[1]
Drying cost per 10 points moisture removed	$ .06/bu.	(12)	$_____/bu.			
Custom Hire, Class A and B						
Field preparation	$0.00	(13)	$_____			
Planting and weed control	0.00	(14)	_____			
Harvest	0.00	(15)	_____			
Other Variable Costs, Class A						
Seed	$5.00	(16)	$_____			
Fertilizer and lime	28.00	(17)	_____			
Herbicide	7.00	(18)	_____			
Insecticide	3.00	(19)	_____			
Crop Insurance	3.00	(20)	_____			
Miscellaneous	.25	(21)	_____			

[1]Item should include only the labor required from the fixed labor supply. Do not include the labor required of the custom operator or hired because job required more than one man.

Grain Sorghum (continued)	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan

Other Variable Costs, Class B

Will these costs be the same as those on Class A land?
(Yes - 1.0; No - 2.0) (29) _____

Seed	$5.00	(30)	$_____
Fertilizer and lime	25.00	(31)	_____
Herbicide	7.00	(32)	_____
Insecticide	3.00	(33)	_____
Crop Insurance	3.00	(34)	_____
Miscellaneous	.25	(35)	_____

D. Forage Sorghum - Variable Cost and Field Time Requirements

		Cost Per Acre		Hours Per Acre		
		Our Plan	Your Plan	Our Plan	Your Plan	
Field Preparation (Spring only)						
Chop stalks		$ .57	$_____	.17 hrs.	_____	hrs.
Spread P and K		.28	_____	.11	_____	
Plow		1.57	_____	.50	_____	
_____		___	___	___	___	
Subtotal		$2.42	$_____	.78 hrs.	_____	hrs.
Planting Operations						
Disk	(2x)	$1.00	$_____	.34 hrs.	_____	hrs.
Plant[1]		.61	_____	.20	(4)_____	
_____		___	___	___	___	
Subtotal		$1.61	(1)$_____	.54 hrs.	(5)_____	hrs.
Weed Control						
Harrow		$ .23	$_____	.08 hrs.	(6)_____	hrs.
Rotary Hoe	($1\frac{1}{2}$x)	.52	_____	.15	(7)_____	
Cultivation	($1\frac{1}{2}$x)	.85	_____	.30	(8)_____	
_____		___	___	___	___	
Subtotal		$1.60	(2)$_____	.53 hrs.	_____	hrs.
Harvest-Silage, Class A						
Chopping		$3.15	$_____	.64 hrs.	(9)_____	hrs.
Haul and store		3.60	_____	0.0	(10)_____	
Hired labor for harvesting forage sorghum silage[2]		___	_____	1.29	(11)_____	
_____		___	___	___	___	
Subtotal		$6.75	(3)$_____	.64 hrs.	(12)_____	hrs.[3]

[1]Herbicide applied with planter attachment in our plan.
[2]Hours of labor needed other than custom operator and/or fixed labor supply because silage harvesting is considered to be at least a two-man job.
[3]Item should include only the labor required from the fixed labor supply. Do not include the labor required of a custom operator or hired labor because job required more than one man.

Forage Sorghum (continued)	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Harvest-Silage, Class B				
Will these costs and field time requirements be the same as those used on Class A land? (Yes - 1.0; No - 2.0)				(28)____
Chopping	$2.83	$____	.58 hrs.	(29)____ hrs.
Haul and store	3.24	____	0.0	(30)____
Hired labor for harvesting forage sorghum silage	___	____	1.16	(31)____ [1]
Subtotal	$6.07	(13)$____	.58 hrs.	(32)____ hrs.[2]
Custom Hire Costs, Class A and B				
Field Preparation	$0.00	(14)$____		
Planting and weed control	0.00	(15) ____		
Harvesting Silage	0.00	(16) ____		
Other Variable Costs, Class A				
Seed	$3.50	(17)$____		
Fertilizer and lime	6.00	(18) ____		
Herbicide	4.00	(19) ____		
Insecticide	0.00	(20) ____		
Miscellaneous	.25	(21) ____		
Other Variable Costs, Class B				
Will these costs be the same as those used on Class A land? (Yes - 1.0; No - 2.0)		(22) ____		
Seed	$3.50	(23)$____		
Fertilizer and lime	5.00	(24) ____		
Herbicide	4.00	(25) ____		
Insecticide	0.00	(26) ____		
Miscellaneous	.25	(27) ____		

[1] Hours of labor needed other than custom operator and/or fixed labor supply because silage harvesting is considered to be at least a two-man job.

[2] Item should include only the labor required from the fixed labor supply. Do not include the labor required of a custom operator or hired labor because job required more than one man.

E. Sorghum Sudan - Variable Cost and Field Time Requirements

		Cost Per Acre		Hours Per Acre	
		Our Plan	Your Plan	Our Plan	Your Plan
Field Preparation, Class A and Class B (Spring only)					
Chop stalks		$ .57	$_____	.17 hrs.	_____ hrs.
Spread P and K		.28	_____	.11	_____
Plow		1.57	_____	.50	_____
_____		____	____	____	____
Subtotal		$2.42	$_____	.78 hrs.	_____ hrs.
Planting Operations, Class A and B					
Disk	(2x)	$1.00	$_____	.34 hrs.	_____ hrs.
Plant[1]		.61	_____	.20	(10)_____
_____		____	____	____	____
Subtotal		$1.61	(1)$_____	.54 hrs.	(11)_____ hrs.
Weed Control, Class A and B					
Harrow		$ .23	$_____	.08 hrs.	(12)_____ hrs.
Rotary Hoe	($1\frac{1}{2}$x)	.52	_____	.15	(13)_____
Cultivation	($1\frac{1}{2}$x)	.85	_____	.30	(14)_____
_____		____	____	____	____
Subtotal		$1.60	(2)$_____	.53 hrs.	_____ hrs.
Custom Hire Costs, Class A and B					
Field preparation		$0.00	(3)$_____		
Planting and weed control		0.00	(4) _____		
Other Variable Costs, Class A					
Seed		$5.50	(5)$_____		
Fertilizer and lime		5.00	(6) _____		
Herbicide		4.00	(7) _____		
Insecticide		0.00	(8) _____		
Miscellaneous		.25	(9) _____		

[1]Herbicide applied with planter attachment in our plan.

Sorghum Sudan (continued)	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan

Other Variable Costs, Class B

Will these costs be the same as those used on Class A land?
(Yes - 1.0; No - 2.0) (15) _____

Seed	$5.50	(16)	$_____
Fertilizer and lime	5.00	(17)	_____
Herbicide	4.00	(18)	_____
Insecticide	0.00	(19)	_____
Miscellaneous	.25	(20)	_____

F. Oats - Variable Costs and Field Time Requirements, Class B Land

	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Growing				
Chop stalks	$ .57	(1)$_____	.17 hrs.	(5)_____ hrs.
Spread fertilizer	.28	_____	.11	_____
Disk (2x)	.82	_____	.30	_____
Seeding	.55	_____	.38	(6)_____
Harrow	.23	_____	.08	(7)_____
Subtotal	$2.45	(2)$_____	1.04 hrs.	(8)_____ hrs.
Harvesting Grain and Straw				
Windrow	$0.00	$_____	.00 hrs.	(9)_____ hrs.
Combine	1.57	_____	.40	(10)_____
Haul and store	.60	_____	.30	(11)_____
Rake straw	.31	_____	.29	(12)_____
Bale straw	5.50	_____	.29	(13)_____
Haul and store straw	.42	_____	.00	(14)_____
Hired labor for straw baling[1]	0.00	_____	1.16	(15)_____
Subtotal	$8.60	(3)$_____	1.28 hrs.	(16)_____ hrs.[2]
Harvesting-Oat Silage				
Windrowing	$custom	$_____	.00 hrs.	(17)_____ hrs.
Chopping	1.89	_____	.55	(18)_____
Haul and store	1.46	_____	.00	(19)_____
Hired labor for silage harvest[1]	0.00	_____	1.65	(20)_____
Subtotal	$3.35	(4)$_____	.55 hrs.	(21)_____ hrs.[2]

[1]Hours of labor needed other than custom operator and/or fixed labor supply because operation is considered to be at least a two-man job.

[2]Item should include only the labor required from the fixed labor supply. Do not include labor required of a custom operator or hired because job required more than one man.

Oats (continued)	Cost Per Acre		Hours Per Acre	
	Cur Plan	Your Plan	Cur Plan	Your Plan
Custom Hire				
Growing	$0.00	(22) $		
Combining	0.00	(23)		
Baling straw	0.00	(24)		
Harvesting-Oat Silage	3.00	(25)		
Other Variable Costs				
Seed	$3.50	(26) $		
Fertilizer and lime	20.90	(27)		
Crop Insurance	0.00	(28)		
Miscellaneous	.25	(29)		

G. Cats - Variable Costs and Field Time Requirements, Class C Land

	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Growing				
Spread fertilizer	$ .28	$_____	.11 hrs.	_____ hrs.
Flow	1.86	(1) _____	.55	(5) _____
Disk (2x)	1.00	_____	.34	_____
Seeding	.55	_____	.38	(6) _____
Harrow	.23	_____	.08	(7) _____
Subtotal	$3.37	(2)$_____	1.46 hrs.	(8) _____ hrs.
Harvesting				
Windrowing	$custom	$_____	.00 hrs.	(9) _____ hrs.
Combine	1.57	_____	.40	(10) _____
Haul and Store	.36	_____	.28	(11) _____
Rake straw	.51	_____	.29	(12) _____
Bale straw	5.25	_____	.35	(13) _____
Haul and store straw	.42	_____	hired	(14) _____
Hired labor for straw baling[1]	0.00	_____	1.00	(15) _____
Subtotal	$8.31	(3)$_____	1.22 hrs.	(16) _____ hrs.[2]
Harvesting-Oat Silage				
Windrowing	$custom	$_____	.00 hrs.	(17) _____ hrs.
Chopping	1.73	_____	.50	(18) _____
Haul and store	1.34	_____	0.0	(19) _____
Hired labor for silage harvest[1]	0.00	_____	1.42	(20) _____
Subtotal	$3.07	(4)$_____	.50 hrs.	(21) _____ hrs.[2]

[1]Hours of labor needed other than custom operator and/or fixed labor supply because operation is considered to be at least a two-man job.

[2]Item should include only the labor required from the fixed labor supply. Do not include labor required of a custom operator or hired because job required more than one man.

Oats (continued)	Cost Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Custom Work				
Growing	$0.00	(22) $		
Combining	0.00	(23)		
Baling straw	0.00	(24)		
Harvesting-Oat Silage	3.00	(25)		
Other Variable Costs				
Seed	$3.50	(26) $		
Fertilizer and lime	20.90	(27)		
Crop Insurance	0.00	(28)		
Miscellaneous	.25	(29)		

Section 10. Forage Production

A. What is the productive life of the following grass and legume pastures?[1]

	Our Plan	Your Plan
Alfalfa-grass	3	(1)____
Birdsfoot Trefoil on Class B	10	(2)____
Crown Vetch	10	(3)____
Kentucky Bluegrass	20	(4)____
Orchardgrass with 120 lbs. of N applied each year	6	(5)____
Orchardgrass with 240 lbs. of N applied each year	4	(6)____
Reed Canarygrass with 120 lbs. of N applied each year	8	(7)____
Reed Canarygrass with 240 lbs. of N applied each year	7	(8)____
Smooth Brome	6	(9)____
Switchgrass	20	(10)____
Tall Fescue	5	(11)____
Birdsfoot Trefoil on Class C	10	(12)____

B. Fertilizer Costs Per Pound

N	$ .16	(1)____
P_2O_5	$ .14	(2)____
K_2O	$ .06	(3)____

[1]The productive life of a forage is defined as being the number of years the forage will be available for use after the seeding year.

Forage Production (continued)

C. Seed Costs Per Pound

	Our Plan	Your Plan
Alfalfa	$1.50	(1)____
Birdsfoot Trefoil	1.90	(2)____
Crown Vetch	3.00	(3)____
Kentucky Bluegrass	1.20	(4)____
Orchardgrass	.68	(5)____
Reed Canarygrass	.70	(6)____
Smooth Brome	.75	(7)____
Switchgrass	.66	(8)____
Tall Fescue	.39	(9)____

D. Variable Costs and Field Time Requirements of Production

	Costs Per Acre		Hours Per Acre	
	Our Plan	Your Plan	Our Plan	Your Plan
Planting				
Drill	$ .51	$____	.33 hrs.	(5)____ hrs.
Subtotal	$ .51	(1)$____	.33 hrs.	(6)____ hrs.
Maintenance				
Clipping	$ .55	(2)$____	.33 hrs.	(7)____ hrs.
Fencing[1]	.58	(3)____	.8	(8)____
Fertilizer application	.28	(4)____	.11	(9)____

[1]This fencing cost is for the additional fencing required when rotational or alternate grazing is used.

Section 11. Harvest and utilization of hay, crop residues, and other forages. These costs should reflect the expense incurred to perform these operations once per year.

	Variable Costs			Hours of Labor		
	Our Plan		Your Plan	Our Plan		Your Plan
A. Harvesting Hay						
Mow	$ .83/A.	(1)	$ ____/A.	.34/A.	(16)	____/A.
Condition	0.00/A.	(2)	____/A.	0.00/A.	(17)	____/A.
Rake	.51/A.	(3)	____/A.	.29/A.	(18)	____/A.
Bale						
Rectangular	2.00/T.	(4)	____/T.	.2 /T.	(19)	____/T.
Small Round Bales	custom/T.	(5)	____/T.	0.0 /T.	(20)	____/T.
Large Round Bales	custom/T.	(6)	____/T.	.1 /T.	(21)	____/T.
Haul and Store	.40/T.	(7)	____/T.	0.0 /T.	(22)	____/T.
Custom Hire for Hay Harvesting						
Baling						
Rectangular	$0.00/T.	(8)	$ ____/T.			
Small Round Bales	15.00/T.	(9)	____/T.			
Large Round Bales	15.00/T.	(10)	____/T.			
B. Harvesting Corn Stalks						
Flail Chopping	$ .80/T.	(11)	$ ____/T.	.25/T.	(23)	____/T.
Hauling and Storage	.36/T.	(12)	____/T.	0.0 /T.	(24)	____/T.
Stakhand Harvest	custom/T.	(13)	____/T.	0.0 /T.	(25)	____/T.
Haul and Storage				.05/T.	(26)	____/T.
Custom Hire for Harvesting Corn Stalks						
Flail Chopping	$0.00/T.	(14)	$ ____/T.			
Stakhand	5.00/T.	(15)	____/T.			
C. Hired Labor[1]						
Hay Baling - Rectangular				.8 /T.	(27)	____/T.
Cornstalk Harvest - Flail Chopper				.25/T.	(28)	____/T.

[1] Hours of labor needed other than custom operator and/or fixed labor supply because hay baling and harvesting cornstalk for ensiling is considered to be at least a two-man job.

Section 11 (continued)

D. Utilization of Harvested Forage

Feeding Hay	$1.02/T.	(1)$____/T.	1.1 /T.	(5)____/T.
Feeding Corn and Sorghum Silage	.66/T.	(2)____/T.	.38/T.	(6)____/T.
Feeding Oat Silage	.74/T.	(3)____/T.	.48/T.	(7)____/T.
Cornstalks in Stakhand	.10/T.	(4)____/T.	.05/T.	(8)____/T.

Section 12. Beef Cow Herd

	Cur Plan	Your Plan
A. General Information		
1. What is the average weight of your mature beef cows?	1000 lbs.	(1) _____ lbs.
2. What is the average value of your cows?	$ 300.00 /cow	(2) _____ /cow
3. Your calving season will begin?	month 3	(3) month _____
4. What percent of cows giving birth to a calf will wean a calf?	90.0 %	(4) _____ %
5. Average weaning weight of steer calves?	450.0 lbs.	(5) _____ lbs.
6. Average weaning weight of heifer calves?	425.0 lbs.	(6) _____ lbs.
7. What percent of the cows will be culled each year?	12.5 %	(7) _____ %
B. Variable Cost and labor requirements for a cow and calf		
Salt and Mineral	$ 8.00 /head	(8) $ _____ /head
Vet and Medical	7.00	(9) _____
Supplies	3.00	(10) _____
Power and Fuel	5.00	(11) _____
Insurance	1.00	(12) _____
Miscellaneous	.50	(13) _____
Subtotal	$ 24.50 /head	(14) _____ /head
Total yearly non-feed labor for a cow and calf	2.73 hrs.	(15) _____ hrs.

Section 12 (continued)	Our Plan	Your Plan
C. Variable Cost and labor requirements for herd bulls		
Salt and Mineral	$ 8.00 /head	(16) $ _____ /head
Vet and Medical	3.00	(17) _____
Supplies	2.00	(18) _____
Power and Fuel	4.00	(19) _____
Insurance	2.00	(20) _____
Miscellaneous	.50	(21) _____
Subtotal	$ 19.50 /head	(22) $ _____ /head
Total yearly non-feed labor per bull	3.00 hrs.	(23) _____ hrs.
D. Variable Cost and labor requirements for replacement stock		
Salt and Mineral	$ 8.00 /head	(24) $ _____ /head
Vet and Medical	6.00	(25) _____
Supplies	2.00	(26) _____
Power and Fuel	3.25	(27) _____
Insurance	1.00	(28) _____
Miscellaneous	.50	(29) _____
Subtotal	$ 20.75 /head	(30) _____ /head
Total yearly non-feed labor per replacement	4.00 hrs.	(31) _____ hrs.

Section 13. Man Hours of Labor Available

	Our Plan	Your Plan
Do you wish to use a 6- or 7-day work week for planning purposes?	6	
Will you hire hourly labor (Yes - 1.0; No - 2.0).	1	
Hourly wage rate.	2.5	

	Hours Available Per Day For Crop and Cow-Calf Production					Hours Available Per Day For Crop and Cow-Calf Production				
	Our Plan					Your Plan				
Periods	No. Days	Operator	Family	Permanent Hired Labor	Total Hours	Operator	Family	Permanent Hired Labor	Total Hours	Hourly Hired Labor
January	31	7	1	0	8					
February	28	7	1	0	8					
March 1-15	15	8	1	0	9					
March 16-31	16	8	1	0	9					
April 1-15	15	8	2	0	10					
April 16-30	15	8	2	0	10					
May 1-15	15	10	2	0	12					
May 16-31	16	10	2	0	12					
June 1-15	15	10	2	0	12					
June 16-30	15	10	2	0	12					
July	31	10	2	0	12					
August	31	9	0	0	9					
Sept. 1-15	15	9	1	0	10					
Sept. 16-30	15	9	1	0	10					
Oct. 1-15	15	9	1	0	10					
Oct. 16-31	16	9	1	0	10					
Nov. 1-15	15	9	1	0	10					
Nov. 16-30	15	9	1	0	10					
December	31	9	1	0	10					

Section 14. Fixed Costs

		Our Plan	Your Plan
1. Total annual fixed machinery and building costs chargeable to crop production.		$10,220.00	$_____
2. Fixed labor costs (average annual cost charge to crop and beef production).			
Operator and family labor	$8,000.00	$_____	
Permanent hired labor	$ 0	$_____	
Total		$ 8,000.00	$_____
3. Total annual fixed building and equipment costs chargeable to beef production.		$ 927.00	$_____

APPENDIX E: SAMPLE OUTPUT OF OPTIMAL SOLUTIONS WITH VARYING FEEDER CALF PRICES

FORAGE PLAN FOR OUR PLAN DATA

LAND USE SUMMARY

	ACRES PLANTED	AVERAGE YIELD	TOTAL HARVESTED [1]
CLASS A LAND			
CORN	50.00	110.00	5500.00
CORN SILAGE	0.00	17.00	0.00
SOYBEANS	0.00	35.00	0.00
GRAIN SORGHUM	0.00	110.00	0.00
FORAGE SORGHUM SILAGE	0.00	15.00	0.00
FORAGE SORGHUM GRAZING	0.00	----	----
SORGHUM SUDAN	0.00	----	----
TOTAL CLASS A	50.00		
CLASS B LAND			
CORN	121.43	100.00	12143.13
CORN SILAGE	0.00	15.30	0.00
SOYBEANS	3.56	33.00	117.35
GRAIN SORGHUM	0.00	100.00	0.00
FORAGE SORGHUM SILAGE	0.00	13.50	0.00
FORAGE SORGHUM GRAZING	0.00	----	----
SORGHUM SUDAN	0.00	----	----
OAT GRAIN	43.37	60.00	2602.11
STRAW		0.80	34.69
OAT SILAGE	0.00	6.11	0.00
HAY	95.77	3.04	291.48
PASTURE	110.88	----	----
TOTAL CLASS B	375.00		
CLASS C LAND			
OAT GRAIN	6.82	55.00	375.00
STRAW		0.80	4.09
OAT SILAGE	0.00	5.60	0.00
HAY	0.00	0.00	0.00
PASTURE	68.18	----	----
TOTAL CLASS C	75.00		

COMPARISON OF LAND UTILIZATON BY CLASS

CLASS	TOTAL UTILIZED	TOTAL AVAILABLE	RETURN [2]
A	50.00	50.00	150.18
B	375.00	375.00	78.15
C	75.00	75.00	45.81
TOTAL	500.00	500.00	

1/ TOTAL YIELD FOR GRAIN IS MEASURED IN BUSHELS, TOTAL YIELD FOR HAY AND SILAGE IS MEASURED IN TON
2/ THE RETURN FIGURE REPRESENTS THE NUMBER OF DOLLARS THE LAST ACRE CONTRIBUTED TO NET INCOME

CROP EXPENSES

FORAGE CROPS

FORAGE SORGHUM

FUEL,OIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTICIDE	0.00	
SEED	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

SORGHUM SUDAN

FUEL,OIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTICIDE	0.00	
SEED	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COST	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

HAY

FUEL,OIL,REPAIRS	1023.83	
FERTILIZER	1862.05	
SEED	423.26	
MACHINE HIRE	0.00	
INTEREST	131.15	
SUBTOTAL		3440.29

PASTURE

FUEL,OIL,REPAIRS	159.57	
FERTILIZER	2121.93	
SEED	212.94	
FENSING	0.00	
INTEREST	100.34	
SUBTOTAL		2594.78

SILAGE

FUEL,OIL,REPAIRS	0.00	
MACHINE HIRE	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

GRAIN CROPS

CORN

FUEL,OIL,REPAIRS	1711.60	
FERTILIZER	4435.78	
HERBICIDE	1200.02	
INSECTICIDE	514.29	
SEED	1421.45	
DRYING COSTS	363.98	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	557.15	
INTEREST	357.15	
SUBTOTAL		10561.43

GRAIN SORGHUM

FUEL,OIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTIDE	0.00	
SEED	0.00	
DRYING COST	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

SOYBEANS

FUEL,OIL,REPAIRS	28.45	
FERTILIZER	28.45	
HERBICIDE	21.34	
INSECTICIDE	0.00	
SEED	28.45	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	11.56	
INTEREST	4.14	
SUBTOTAL		122.38

OATS

FUEL,OIL,REPAIRS	558.86	
FERTILIZER	1048.90	
SEED	175.65	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	12.55	
INTEREST	62.86	
SUBTOTAL		1858.82

CROP EXPENSES CONTINUED

CORNSTALKS HARVESTED

FUEL,OIL,REPAIRS	92.01	
MACHINE HIRE	149.24	
INTEREST	8.44	
SUBTOTAL		249.69

LIVESTOCK EXPENSES

COW-CALF 164.12 HEAD

SALT AND MINERAL	1312.92	
VET AND MEDICAL	1148.81	
POWER AND FUEL	820.58	
OTHER VARIABLE COSTS	738.52	
INTEREST	281.46	
SUBTOTAL		4302.29

BULLS 6.56 HEAD

SALT AND MINERAL	52.52	
VET AND MEDICAL	19.69	
POWER AND FUEL	26.26	
OTHER VARIABLE COSTS	29.54	
INTEREST	8.96	
SUBTOTAL		136.97

REPLACEMENTS 21.15 HEAD

SALT AND MINERAL	169.19	
VET AND MEDICAL	126.89	
POWER AND FUEL	68.73	
OTHER VARIABLE COSTS	74.02	
INTEREST	30.72	
SUBTOTAL		469.56

INCOME STATEMENT

INCOME	
CORN	32992.65
GRAIN SORGHUM	0.00
SOYBEANS	621.98
OATS	2977.11
STRAW	1163.57
CULL COWS	5128.61
STEERS	14955.03
HEIFERS	9183.51
TOTAL	67022.47

EXPENSES	
FUEL,OIL,REPAIRS	3574.32
FERTILIZER	9497.12
HERBICIDE	1221.36
INSECTICIDE	514.29
SEED	2261.76
DRYING COSTS	363.98
MACHINE HIRE	149.24
OTHER VARIABLE COSTS	581.26
LIVESTOCK EXPENSES	4587.68
HIRED LABOR	1112.20
REPLACEMENTS	-0.00
FEEDING COSTS	358.99
INTEREST	1010.35
TOTAL	25232.53

RETURN OVER VARIABLE COST	41789.94
FIXED LAND CHARGE	12500.00
FIXED LABOR	8000.00
FIXED CROP	10220.00
FIXED LIVESTOCK	5065.51
RETURN TO MANAGEMENT	6004.43

LABOR SUMMARY

PERIOD	FIXED LABOR UTILIZED	TOTAL FIXED LABOR SUPPLY	HOURLY HIRED LABOR [1]	RETURN [2]
JANUARY	104.60	212.57	0.00	-0.00
FEBRUARY	131.50	192.00	0.00	-0.00
MARCH 1-15	86.61	115.71	0.00	-0.00
MARCH 16-31	113.12	123.43	0.00	-0.00
APRIL 1-15	128.57	128.57	128.57	2.50
APRIL 16-30	128.57	128.57	15.98	2.50
MAY 1-15	106.12	154.29	0.00	-0.00
MAY 16-31	40.56	164.57	0.00	-0.00
JUNE 1-15	154.29	154.29	28.73	2.50
JUNE 16-30	96.40	154.29	0.00	-0.00
JULY	249.79	318.86	0.00	-0.00
AUGUST	62.17	239.14	0.00	-0.00
SEPTEMBER 1-15	23.45	128.57	0.00	-0.00
SEPTEMBER 16-30	26.31	128.57	0.00	-0.00
OCTOBER 1-15	26.14	128.57	0.00	-0.00
OCTOBER 16-31	137.14	137.14	0.00	2.38
NOVEMBER 1-15	128.57	128.57	0.00	1.82
NOVEMBER 16-30	20.45	128.57	0.00	-0.00
DECEMBER	168.07	257.14	0.00	-0.00
TOTAL	1932.43	3123.43	173.28	

1/ HOURLY HIRED LABOR DOES NOT INCLUDE HOURLY LABOR HIRED BECAUSE JOB REQUIRES MORE THAN ONE MAN
2/ THE RETURN FIGURE REPRESENTS THE NUMBER OF DOLLARS THE LAST HOUR CONTRIBUTED TO NET INCOME

FORAGES IN THE PLAN

	ACRES	PENALTY 1/
ORCHARDGRASS 120N		
CONTINUOUS GRAZE	0.00	14.98
3-SEASON	0.00	20.29
3-SEASON EARLY	0.00	20.77
HARVEST 2 CROPS	0.00	25.64
ORCHARDGRASS 240N		
3-SEASON EARLY	22.91	-0.00
HARVEST 1 CROP	0.00	5.71
HARVEST 2 CROPS	0.00	-0.00
ALFALFA-GRASS		
ROTATIONAL GRAZE	0.00	7.82
HARVEST 1 CROP	0.00	7.61
HARVEST 2 CROPS	0.00	0.57
HARVEST 2 CROPS STOCKPILE	52.18	-0.00
HARVEST 3 CROPS	19.53	-0.00
ROUND BALE GRAZING OCT.		
ALFALFA-GRASS	0.00	13.78
SMOOTH BROME 120N	0.00	36.61
ORCHARDGRASS 120N	0.00	40.24
REED CANARYGRASS 120N	0.00	26.77
TALL FESCUE 240N	0.00	13.50
REED CANARYGRASS 240N	0.00	14.42
SMOOTH BROME 240N	0.00	16.10
ORCHARDGRASS 240N	0.00	13.20
BIRDSFOOT TREFOIL	0.00	24.44
BIRDSFOOT TREFOIL C	0.00	23.06
LARGE ROUND BALE GRAZING OCT.		
ALFALFA-GRASS	0.00	10.82
SMOOTH BROME 120N	0.00	32.62
ORCHARDGRASS 120N	0.00	35.25
REED CANARYGRASS 120N	0.00	21.56
TALL FESCUE 240N	0.00	9.72
REED CANARYGRASS 240N	0.00	11.20
SMOOTH BROME 240N	0.00	12.42
ORCHARDGRASS 240N	0.00	9.94
BIRDSFOOT TREFOIL	0.00	21.54
BIRDSFOOT TREFOIL C	0.00	21.54
BIRDSFOOT TREFOIL C		
CONTINUOUS GRAZE	68.18	-0.00
STOCKPILE 1	0.00	8.15
STOCKPILE 2	0.00	-0.00
HARVEST 1 CROP	0.00	16.54

	ACRES	PENALTY 1/
SMOOTH BROME 120N		
CONTINUOUS GRAZE	0.00	14.75
3-SEASON	0.00	20.46
3-SEASON EARLY	0.00	20.80
HARVEST 2 CROPS	0.00	21.47
SMOOTH BROME 240N		
3-SEASON EARLY	0.00	7.98
HARVEST 1 CROP	0.00	6.37
HARVEST 2 CROPS	0.00	-0.00
TALL FESCUE 240N		
3-SEASON	0.00	6.33
HARVEST 1 CROP	0.00	4.36
HARVEST 2 CROPS	24.06	-0.00
SWITCHGRASS 60N		
CONTINUOUS GRAZE	0.00	20.15
ROUND BALE GRAZING NOV.		
ALFALFA-GRASS	0.00	12.22
SMOOTH BROME 120N	0.00	34.26
ORCHARDGRASS 120N	0.00	37.68
REED CANARYGRASS 120N	0.00	24.10
TALL FESCUE 240N	0.00	10.15
REED CANARYGRASS 240N	0.00	10.88
SMOOTH BROME 240N	0.00	13.01
ORCHARDGRASS 240N	0.00	10.06
BIRDSFOOT TREFOIL	0.00	22.52
BIRDSFOOT TREFOIL C	0.00	21.15
LARGE ROUND BALE GRAZING NOV.		
ALFALFA-GRASS	0.00	9.04
SMOOTH BROME 120N	0.00	29.97
ORCHARDGRASS 120N	0.00	32.31
REED CANARYGRASS 120N	0.00	18.51
TALL FESCUE 240N	0.00	6.09
REED CANARYGRASS 240N	0.00	7.43
SMOOTH BROME 240N	0.00	9.06
ORCHARDGRASS 240N	0.00	6.56
BIRDSFOOT TREFOIL	0.00	19.31
BIRDSFOOT TREFOIL C	0.00	19.31
KENTUCKY BLUEGRASS 60N		
CONTINUOUS GRAZE	0.00	12.39
3-SEASON	0.00	1.01

	ACRES	PENALTY 1/
BIRDSFOOT TREFOIL		
CONTINUOUS GRAZE	9.98	-0.00
STOCKPILE 1	0.00	8.15
STOCKPILE 2	74.97	-0.00
HARVEST 1 CROP	0.00	16.54
REED CANARYGRASS 240N		
3-SEASON	3.02	-0.00
3-SEASON EARLY	0.00	6.46
HARVEST 1 CROP	0.00	5.93
HARVEST 2 CROPS	0.00	2.47
CROWNVETCH		
CONTINUOUS GRAZE	0.00	1.51
KENTUCKY BLUEGRASS		
CONTINUOUS GRAZE	0.00	18.58
ROUND BALE GRAZING DEC.		
ALFALFA-GRASS	0.00	10.85
SMOOTH BROME 120N	0.00	32.18
ORCHARDGRASS 120N	0.00	35.41
REED CANARYGRASS 120N	0.00	21.75
TALL FESCUE 240N	0.00	7.19
REED CANARYGRASS 240N	0.00	7.76
SMOOTH BROME 240N	0.00	10.27
ORCHARDGRASS 240N	0.00	7.28
BIRDSFOOT TREFOIL	0.00	20.83
BIRDSFOOT TREFOIL C	0.00	19.45
LARGE ROUND BALE GRAZING DEC.		
ALFALFA-GRASS	0.00	7.47
SMOOTH BROME 120N	0.00	27.63
ORCHARDGRASS 120N	0.00	29.73
REED CANARYGRASS 120N	0.00	15.82
TALL FESCUE 240N	0.00	2.88
REED CANARYGRASS 240N	0.00	4.09
SMOOTH BROME 240N	0.00	6.09
ORCHARDGRASS 240N	0.00	3.58
BIRDSFOOT TREFOIL	0.00	17.35
BIRDSFOOT TREFOIL C	0.00	17.35
REED CANARYGRASS 120N		
CONTINUOUS GRAZE	0.00	12.67
HARVEST 1 CROP	0.00	26.77

1/ THE PENALTY REFERS TO HOW MUCH NET INCOME WOULD BE REDUCED IF ONE ACRE OF THIS FORAGE WAS INCLUDED IN THE PLAN

FORAGES IN THE PLAN CONTINUED

SUPPLEMENTAL PASTURES CLASS A			SUPPLEMENTAL PASTURES CLASS B		
SORGHUM SUDAN ALT. GR.	0.00	-0.00	SORGHUM SUDAN ALT. GR.	0.00	-0.00
SORGHUM SUDAN STOCKPILE	0.00	26.91	SORGHUM SUDAN STOCKPILE	0.00	25.06
FORAGE SORGHUM STOCKPILE	0.00	80.56	FORAGE SORGHUM STOCKPILE	0.00	78.27
FORAGE SORGHUM STUBBLE	0.00	-0.00	FORAGE SORGHUM STUBBLE	0.00	-0.00
CORNSTALKS HARVESTED	0.00	----	CORNSTALKS HARVESTED	121.43	----
CORNSTALKS GRAZED			CORNSTALKS GRAZED		
OCTOBER	0.00	----	OCTOBER	0.00	----
NOVEMBER	50.00	----	NOVEMBER	77.34	----
DECEMBER	50.00	----	DECEMBER	121.43	----
JANUARY	50.00	----	JANUARY	121.43	----
GRAIN SORGHUM STUBBLE GRAZED			GRAIN SORGHUM STUBBLE GRAZED		
OCTOBER	0.00	----	OCTOBER	0.00	----
NOVEMBER	0.00	----	NOVEMBER	0.00	----
DECEMBER	0.00	----	DECEMBER	0.00	----
JANUARY	0.00	----	JANUARY	0.00	----
FEBRUARY	0.00	----	FEBRUARY	0.00	----

NUTRIENT REQUIREMENTS

TOTAL DIGESTIBLE NUTRIENTS

MONTH	REQUIRED	EXCESS	RETURN [1]
JANUARY	59801.57	0.00	0.03460
FEBRUARY	49476.88	0.00	0.03460
MARCH	73138.54	0.00	0.03460
APRIL	68337.39	0.00	0.03825
MAY	84762.52	0.00	0.03421
JUNE	77262.63	0.00	0.02907
JULY	84735.00	0.00	0.01565
AUGUST	86827.27	0.00	0.02751
SEPTEMBER	86111.99	0.00	0.02879
OCTOBER	50941.70	25979.02	-0.00000
NOVEMBER	49820.59	0.00	0.02673
DECEMBER	52265.58	0.00	0.03460

DIGESTIBLE PROTEIN

JANUARY	11207.10	4620.40	-0.00000
FEBRUARY	11066.19	2353.65	-0.00000
MARCH	14133.84	684.74	-0.00000
APRIL	14384.53	7629.13	-0.00000
MAY	15219.25	7667.36	-0.00000
JUNE	15211.86	7623.15	-0.00000
JULY	15890.63	9349.86	-0.00000
AUGUST	15909.71	10189.07	-0.00000
SEPTEMBER	20065.68	10944.04	-0.00000
OCTOBER	12140.91	12512.36	-0.00000
NOVEMBER	16034.26	2669.48	-0.00000
DECEMBER	12550.32	1574.56	-0.00000

1/ THE RETURN FIGURE REPRESENTS HOW MUCH THE LAST POUND OF TON OR DIGESTIBLE PROTEIN CONTRIBUTED TO NET INCOME

STORED ROUGHAGE FED (TCN/MONTH)

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
ALFALFA-GRASS	55.80	36.67	0.00	85.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.12
BIRDSFOOT TR.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ORCHARDGRASS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMOOTH BROME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REED CANARY.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TALL FESCUE	0.00	0.00	95.56	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.74
OAT HAY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STRAW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORN SILAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OAT SILAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FOR. SOR. SIL.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORNSTALKS-FLAIL	0.00	79.32	0.00	----	----	----	----	----	----	----	0.00	0.00
CORNSTALKS-SH.	0.00	0.00	29.85	----	----	----	----	----	----	----	----	0.00

THIS SECTION REPORTS THE OPTIMAL SOLUTION WITH PRICE OF FEEDER CALVES
15% HIGHER THAN PLAN 1

LAND USE SUMMARY

	ACRES PLANTED	AVERAGE YIELD	TOTAL HARVESTED [1]
CLASS A LAND			
CORN	40.08	110.00	4408.72
CORN SILAGE	0.00	17.00	0.00
SOYBEANS	0.00	35.00	0.00
GRAIN SORGHUM	9.92	110.00	1091.28
FORAGE SORGHUM SILAGE	0.00	15.00	0.00
FORAGE SORGHUM GRAZING	0.00	----	----
SORGHUM SUDAN	0.00	----	----
TOTAL CLASS A	50.00		
CLASS B LAND			
CORN	124.99	100.00	12498.75
CORN SILAGE	0.00	15.30	0.00
SOYBEANS	0.00	33.00	0.00
GRAIN SORGHUM	0.00	100.00	0.00
FORAGE SORGHUM SILAGE	0.00	13.50	0.00
FORAGE SORGHUM GRAZING	0.00	----	----
SORGHUM SUDAN	0.00	----	----
OAT GRAIN	38.94	60.00	2336.28
STRAW		0.80	31.15
OAT SILAGE	0.00	6.11	0.00
HAY	101.21	3.16	319.45
PASTURE	109.86	----	----
TOTAL CLASS B	375.00		
CLASS C LAND			
OAT GRAIN	6.82	55.00	375.00
STRAW		0.80	4.09
OAT SILAGE	0.00	5.60	0.00
HAY	0.00	0.00	0.00
PASTURE	68.18	----	----
TOTAL CLASS C	75.00		

COMPARISON OF LAND UTILIZATON BY CLASS

CLASS	TOTAL UTILIZED	TOTAL AVAILABLE	RETURN [2]
A	50.00	50.00	154.51
B	375.00	375.00	89.24
C	75.00	75.00	59.66
TOTAL	500.00	500.00	

1/ TOTAL YIELD FOR GRAIN IS MEASURED IN BUSHELS, TOTAL YIELD FOR HAY AND SILAGE IS MEASURED IN TON
2/ THE RETURN FIGURE REPRESENTS THE NUMBER OF DOLLARS THE LAST ACRE CONTRIBUTED TO NET INCOME

CROP EXPENSES

FORAGE CROPS

FORAGE SORGHUM

FUEL,CIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTICIDE	0.00	
SEED	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

SORGHUM SUCAN

FUEL,CIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTICIDE	0.00	
SEED	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COST	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

HAY

FUEL,CIL,REPAIRS	1080.38	
FERTILIZER	2680.51	
SEED	358.33	
MACHINE HIRE	154.26	
INTEREST	162.61	
SUBTOTAL		4436.08

PASTURE

FUEL,CIL,REPAIRS	156.98	
FERTILIZER	1298.09	
SEED	202.74	
FENSING	5.96	
INTEREST	70.82	
SUBTOTAL		1734.60

SILAGE

FUEL,OIL,REPAIRS	0.00	
MACHINE HIRE	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

GRAIN CROPS

CORN

FUEL,OIL,REPAIRS	1646.28	
FERTILIZER	4246.91	
HERBICIDE	1155.47	
INSECTICIDE	495.20	
SEED	1360.61	
DRYING COSTS	344.98	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	536.47	
INTEREST	342.51	
SUBTOTAL		10128.42

GRAIN SORGHUM

FUEL,OIL,REPAIRS	94.64	
FERTILIZER	277.78	
HERBICIDE	69.45	
INSECTIDE	29.76	
SEED	49.60	
DRYING COST	19.64	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	32.24	
INTEREST	20.06	
SUBTOTAL		593.18

SOYBEANS

FUEL,OIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTICIDE	0.00	
SEED	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

OATS

FUEL,OIL,REPAIRS	509.90	
FERTILIZER	956.31	
SEED	160.15	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	11.44	
INTEREST	57.32	
SUBTOTAL		1695.12

CROP EXPENSES CONTINUED

CORNSTALKS HARVESTED

FUEL,OIL,REPAIRS	80.60	
MACHINE HIRE	193.74	
INTEREST	9.60	
SUBTOTAL		283.95

LIVESTOCK EXPENSES

COW-CALF 194.91 HEAD

SALT AND MINERAL	1559.32	
VET AND MEDICAL	1364.40	
POWER AND FUEL	974.57	
OTHER VARIABLE COSTS	877.11	
INTEREST	334.28	
SUBTOTAL		5109.68

BULLS 7.80 HEAD

SALT AND MINERAL	62.37	
VET AND MEDICAL	23.39	
POWER AND FUEL	31.19	
OTHER VARIABLE COSTS	35.08	
INTEREST	10.64	
SUBTOTAL		162.68

REPLACEMENTS 0.00 HEAD

SALT AND MINERAL	0.00	
VET AND MEDICAL	0.00	
POWER AND FUEL	0.00	
OTHER VARIABLE COSTS	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

INCOME STATEMENT

INCOME	
CORN	31616.96
GRAIN SORGHUM	1833.36
SOYBEANS	0.00
OATS	2711.28
STRAW	1057.24
CULL COWS	6091.08
STEERS	20425.81
HEIFERS	17576.29
TOTAL	81312.02

EXPENSES	
FUEL,OIL,REPAIRS	3558.78
FERTILIZER	9459.59
HERBICIDE	1224.91
INSECTICIDE	524.96
SEED	2131.43
DRYING COSTS	364.62
MACHINE HIRE	348.00
OTHER VARIABLE COSTS	586.11
LIVESTOCK EXPENSES	4927.44
HIRED LABOR	1184.43
REPLACEMENTS	9136.61
FEEDING COSTS	381.12
INTEREST	1034.52
TOTAL	34872.55

RETURN OVER VARIABLE COST	46439.47
FIXED LAND CHARGE	12500.00
FIXED LABOR	8000.00
FIXED CROP	10220.00
FIXED LIVESTOCK	5347.66
RETURN TO MANAGEMENT	10371.81

LABOR SUMMARY

PERIOD	FIXED LABOR UTILIZED	TOTAL FIXED LABOR SUPPLY	HOURLY HIRED LABOR [1]	RETURN [2]
JANUARY	62.20	212.57	0.00	-0.00
FEBRUARY	122.67	192.00	0.00	-0.00
MARCH 1-15	95.52	115.71	0.00	-0.00
MARCH 16-31	123.43	123.43	0.00	-0.00
APRIL 1-15	128.57	128.57	128.57	2.50
APRIL 16-30	128.57	128.57	20.29	2.50
MAY 1-15	141.22	154.29	0.00	-0.00
MAY 16-31	74.80	164.57	0.00	-0.00
JUNE 1-15	153.28	154.29	0.00	-0.00
JUNE 16-30	130.75	154.29	0.00	-0.00
JULY	261.87	318.86	0.00	-0.00
AUGUST	48.53	239.14	0.00	-0.00
SEPTEMBER 1-15	24.71	128.57	0.00	-0.00
SEPTEMBER 16-30	24.71	128.57	0.00	-0.00
OCTOBER 1-15	27.90	128.57	0.00	-0.00
OCTOBER 16-31	137.14	137.14	0.00	1.00
NOVEMBER 1-15	128.57	128.57	0.00	0.32
NOVEMBER 16-30	18.25	128.57	0.00	-0.00
DECEMBER	150.77	257.14	0.00	-0.00
TOTAL	1983.47	3123.43	148.87	

1/ HOURLY HIRED LABOR DOES NOT INCLUDE HOURLY LABOR HIRED BECAUSE JOB REQUIRES MORE THAN ONE MAN
2/ THE RETURN FIGURE REPRESENTS THE NUMBER OF DOLLARS THE LAST HOUR CONTRIBUTED TO NET INCOME

FORAGES IN THE PLAN

	ACRES	PENALTY 1/
ORCHARDGRASS 120N		
CONTINUOUS GRAZE	0.00	16.91
3-SEASON	0.00	26.94
3-SEASON EARLY	0.00	26.83
HARVEST 2 CROPS	0.00	32.65
ORCHARDGRASS 240N		
3-SEASON EARLY	0.00	-0.00
HARVEST 1 CROP	0.00	6.42
HARVEST 2 CROPS	0.00	-0.00
ALFALFA-GRASS		
ROTATIONAL GRAZE	0.00	11.49
HARVEST 1 CROP	0.00	7.31
HARVEST 2 CROPS	0.00	1.05
HARVEST 2 CROPS STOCKPILE	55.99	-0.00
HARVEST 3 CROPS	0.00	2.66
ROUND BALE GRAZING OCT.		
ALFALFA-GRASS	0.00	16.23
SMOOTH BROME 120N	0.00	42.11
ORCHARDGRASS 120N	0.00	47.62
REED CANARYGRASS 120N	0.00	31.28
TALL FESCUE 240N	0.00	12.85
REED CANARYGRASS 240N	0.00	13.50
SMOOTH BROME 240N	0.00	15.46
ORCHARDGRASS 240N	0.00	12.53
BIRDSFOOT TREFOIL	0.00	28.75
BIRDSFOOT TREFOIL C	0.00	27.37
LARGE ROUND BALE GRAZING OCT.		
ALFALFA-GRASS	0.00	12.87
SMOOTH BROME 120N	0.00	37.59
ORCHARDGRASS 120N	0.00	41.96
REED CANARYGRASS 120N	0.00	25.38
TALL FESCUE 240N	0.00	8.56
REED CANARYGRASS 240N	0.00	9.85
SMOOTH BROME 240N	0.00	11.29
ORCHARDGRASS 240N	0.00	8.84
BIRDSFOOT TREFOIL	0.00	25.30
BIRDSFOOT TREFOIL C	0.00	25.30
BIRDSFOOT TREFOIL C		
CONTINUOUS GRAZE	68.18	-0.00
STOCKPILE 1	0.00	8.48
STOCKPILE 2	0.00	-0.00
HARVEST 1 CROP	0.00	16.93

	ACRES	PENALTY 1/
SMOOTH BROME 120N		
CONTINUOUS GRAZE	0.00	14.73
3-SEASON	0.00	25.27
3-SEASON EARLY	0.00	24.91
HARVEST 2 CROPS	0.00	27.35
SMOOTH BROME 240N		
3-SEASON EARLY	0.00	6.42
HARVEST 1 CROP	0.00	8.86
HARVEST 2 CROPS	0.00	-0.00
TALL FESCUE 240N		
3-SEASON	0.00	7.17
HARVEST 1 CROP	0.00	4.77
HARVEST 2 CROPS	34.94	-0.00
SWITCHGRASS 60N		
CONTINUOUS GRAZE	0.00	21.30
ROUND BALE GRAZING NOV.		
ALFALFA-GRASS	0.00	14.60
SMOOTH BROME 120N	0.00	39.64
ORCHARDGRASS 120N	0.00	44.93
REED CANARYGRASS 120N	0.00	28.49
TALL FESCUE 240N	0.00	9.33
REED CANARYGRASS 240N	0.00	9.79
SMOOTH BROME 240N	0.00	12.22
ORCHARDGRASS 240N	0.00	9.24
BIRDSFOOT TREFOIL	0.00	26.74
BIRDSFOOT TREFOIL C	0.00	25.36
LARGE ROUND BALE GRAZING NOV.		
ALFALFA-GRASS	0.00	11.01
SMOOTH BROME 120N	0.00	34.81
ORCHARDGRASS 120N	0.00	38.89
REED CANARYGRASS 120N	0.00	22.19
TALL FESCUE 240N	0.00	4.76
REED CANARYGRASS 240N	0.00	5.90
SMOOTH BROME 240N	0.00	7.77
ORCHARDGRASS 240N	0.00	5.30
BIRDSFOOT TREFOIL	0.00	22.97
BIRDSFOOT TREFOIL C	0.00	22.97
KENTUCKY BLUEGRASS 60N		
CONTINUOUS GRAZE	0.00	15.48
3-SEASON	0.00	3.53

	ACRES	PENALTY 1/
BIRDSFOOT TREFOIL		
CONTINUOUS GRAZE	51.31	-0.00
STOCKPILE 1	0.00	8.48
STOCKPILE 2	52.86	-0.00
HARVEST 1 CROP	0.00	16.93
REED CANARYGRASS 240N		
3-SEASON	5.69	-0.00
3-SEASON EARLY	0.00	6.43
HARVEST 1 CROP	0.00	6.14
HARVEST 2 CROPS	0.00	2.70
CROWNVETCH		
CONTINUOUS GRAZE	0.00	1.60
KENTUCKY BLUEGRASS		
CONTINUOUS GRAZE	0.00	26.18
ROUND BALE GRAZING DEC.		
ALFALFA-GRASS	0.00	12.56
SMOOTH BROME 120N	0.00	36.56
ORCHARDGRASS 120N	0.00	41.57
REED CANARYGRASS 120N	0.00	24.99
TALL FESCUE 240N	0.00	4.94
REED CANARYGRASS 240N	0.00	5.16
SMOOTH BROME 240N	0.00	8.16
ORCHARDGRASS 240N	0.00	5.12
BIRDSFOOT TREFOIL	0.00	24.22
BIRDSFOOT TREFOIL C	0.00	22.85
LARGE ROUND BALE GRAZING DEC.		
ALFALFA-GRASS	0.00	8.69
SMOOTH BROME 120N	0.00	31.34
ORCHARDGRASS 120N	0.00	35.05
REED CANARYGRASS 120N	0.00	18.19
TALL FESCUE 240N	10.28	-0.00
REED CANARYGRASS 240N	0.00	0.95
SMOOTH BROME 240N	0.00	3.36
ORCHARDGRASS 240N	0.00	0.87
BIRDSFOOT TREFOIL	0.00	20.06
BIRDSFOOT TREFOIL C	0.00	20.06
REED CANARYGRASS 120N		
CONTINUOUS GRAZE	0.00	13.36
HARVEST 1 CROP	0.00	31.28

1/ THE PENALTY REFERS TO HOW MUCH NET INCOME WOULD BE REDUCED IF ONE ACRE OF THIS FORAGE WAS INCLUDED IN THE PLAN

FORAGES IN THE PLAN CONTINUED

SUPPLEMENTAL PASTURES CLASS A			SUPPLEMENTAL PASTURES CLASS B		
SORGHUM SUDAN ALT. GR.	0.00	-0.00	SORGHUM SUDAN ALT. GR.	0.00	-0.00
SORGHUM SUDAN STOCKPILE	0.00	45.08	SORGHUM SUDAN STOCKPILE	0.00	41.68
FORAGE SORGHUM STOCKPILE	0.00	74.05	FORAGE SORGHUM STOCKPILE	0.00	74.36
FORAGE SORGHUM STUBBLE	0.00	-0.00	FORAGE SORGHUM STUBBLE	0.00	-0.00
CORNSTALKS HARVESTED	0.00	----	CORNSTALKS HARVESTED	124.99	----
CORNSTALKS GRAZED			CORNSTALKS GRAZED		
OCTOBER	0.00	----	OCTOBER	0.00	----
NOVEMBER	40.08	----	NOVEMBER	67.74	----
DECEMBER	40.08	----	DECEMBER	124.99	----
JANUARY	40.08	----	JANUARY	124.99	----
GRAIN SORGHUM STUBBLE GRAZED			GRAIN SORGHUM STUBBLE GRAZED		
OCTOBER	0.00	----	OCTOBER	0.00	----
NOVEMBER	9.92	----	NOVEMBER	0.00	----
DECEMBER	9.92	----	DECEMBER	0.00	----
JANUARY	9.92	----	JANUARY	0.00	----
FEBRUARY	9.92	----	FEBRUARY	0.00	----

NUTRIENT REQUIREMENTS

TOTAL DIGESTIBLE NUTRIENTS

MONTH	REQUIRED	EXCESS	RETURN [1]
JANUARY	55819.20	0.00	0.03969
FEBRUARY	53910.21	0.00	0.03969
MARCH	73130.53	0.00	0.03969
APRIL	76779.72	0.00	0.04334
MAY	85464.47	0.00	0.03969
JUNE	86910.39	0.00	0.03441
JULY	92987.19	0.00	0.02294
AUGUST	95472.11	0.00	0.03512
SEPTEMBER	93722.65	0.00	0.03745
OCTOBER	51952.10	19045.98	-0.00000
NOVEMBER	50860.97	0.00	0.02801
DECEMBER	53764.81	0.00	0.03969

DIGESTIBLE PROTEIN

JANUARY	4723.91	1244.80	-0.00000
FEBRUARY	4556.55	1564.46	-0.00000
MARCH	7764.42	1395.12	-0.00000
APRIL	8062.15	8341.65	-0.00000
MAY	8882.25	6169.14	-0.00000
JUNE	8873.48	9426.49	-0.00000
JULY	9373.19	10887.84	-0.00000
AUGUST	9395.85	11138.54	-0.00000
SEPTEMBER	9116.73	11741.33	-0.00000
OCTOBER	4400.04	11000.01	-0.00000
NOVEMBER	4307.80	2306.16	-0.00000
DECEMBER	4552.30	848.82	-0.00000

1/ THE RETURN FIGURE REPRESENTS HOW MUCH THE LAST POUND OF TON OR DIGESTIBLE PROTEIN CONTRIBUTED TO NET INCOME

STORED ROUGHAGE FED (TON/MONTH)

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
ALFALFA-GRASS	19.88	21.29	0.00	96.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BIRDSFOOT TR.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ORCHARDGRASS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMOOTH BROME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REED CANARY.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TALL FESCUE	0.00	14.01	107.11	0.00	54.32	0.00	0.00	0.00	0.00	0.00	0.00	5.89
OAT HAY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STRAW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORN SILAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OAT SILAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FOR. SOR. SIL.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORNSTALKS-FLAIL	0.00	69.48	0.00	----	----	----	----	----	----	----	0.00	0.00
CORNSTALKS-SH.	31.16	0.00	7.59	----	----	----	----	----	----	----	----	0.00

THIS SECTION REPORTS THE OPTIMAL SOLUTION WITH PRICE OF FEEDER CALVES
15% LOWER THAN IN PLAN 1

LAND USE SUMMARY

	ACRES PLANTED	AVERAGE YIELD	TOTAL HARVESTED [1]
CLASS A LAND			
CORN	50.00	110.00	5500.00
CORN SILAGE	0.00	17.00	0.00
SOYBEANS	0.00	35.00	0.00
GRAIN SORGHUM	0.00	110.00	0.00
FORAGE SORGHUM SILAGE	0.00	15.00	0.00
FORAGE SORGHUM GRAZING	0.00	----	----
SORGHUM SUDAN	0.00	----	----
TOTAL CLASS A	50.00		
CLASS B LAND			
CORN	124.99	100.00	12498.75
CORN SILAGE	0.00	15.30	0.00
SOYBEANS	0.00	33.00	0.00
GRAIN SORGHUM	0.00	100.00	0.00
FORAGE SORGHUM SILAGE	0.00	13.50	0.00
FORAGE SORGHUM GRAZING	0.00	----	----
SORGHUM SUDAN	0.00	----	----
OAT GRAIN	96.92	60.00	5815.46
STRAW		0.80	77.54
OAT SILAGE	0.00	6.11	0.00
HAY	95.31	2.69	256.17
PASTURE	57.78	----	----
TOTAL CLASS B	375.00		
CLASS C LAND			
OAT GRAIN	6.82	55.00	375.00
STRAW		0.80	4.09
OAT SILAGE	0.00	5.60	0.00
HAY	0.00	0.00	0.00
PASTURE	68.18	----	----
TOTAL CLASS C	75.00		

COMPARISON OF LAND UTILIZATON BY CLASS

CLASS	TOTAL UTILIZED	TOTAL AVAILABLE	RETURN [2]
A	50.00	50.00	150.51
B	375.00	375.00	70.68
C	75.00	75.00	34.78
TOTAL	500.00	500.00	

1/ TOTAL YIELD FOR GRAIN IS MEASURED IN BUSHELS, TOTAL YIELD FOR HAY AND SILAGE IS MEASURED IN TON
2/ THE RETURN FIGURE REPRESENTS THE NUMBER OF DOLLARS THE LAST ACRE CONTRIBUTED TO NET INCOME

CROP EXPENSES

FORAGE CROPS

FORAGE SORGHUM

FUEL,OIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTICIDE	0.00	
SEED	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

SORGHUM SUCAN

FUEL,OIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTICIDE	0.00	
SEED	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COST	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

HAY

FUEL,OIL,REPAIRS	954.60	
FERTILIZER	991.21	
SEED	528.89	
MACHINE HIRE	0.00	
INTEREST	105.69	
SUBTOTAL		2580.39

PASTURE

FUEL,OIL,REPAIRS	141.25	
FERTILIZER	1743.06	
SEED	446.44	
FENSING	0.00	
INTEREST	102.15	
SUBTOTAL		2432.91

SILAGE

FUEL,OIL,REPAIRS	0.00	
MACHINE HIRE	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

GRAIN CROPS

CORN

FUEL,OIL,REPAIRS	1746.88	
FERTILIZER	4524.69	
HERBICIDE	1224.91	
INSECTICIDE	524.96	
SEED	1449.90	
DRYING COSTS	372.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	568.71	
INTEREST	364.42	
SUBTOTAL		10776.47

GRAIN SORGHUM

FUEL,OIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTIDE	0.00	
SEED	0.00	
DRYING COST	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

SOYBEANS

FUEL,OIL,REPAIRS	0.00	
FERTILIZER	0.00	
HERBICIDE	0.00	
INSECTICIDE	0.00	
SEED	0.00	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	0.00	
INTEREST	0.00	
SUBTOTAL		0.00

OATS

FUEL,OIL,REPAIRS	1150.65	
FERTILIZER	2168.22	
SEED	363.10	
MACHINE HIRE	0.00	
OTHER VARIABLE COSTS	25.94	
INTEREST	129.78	
SUBTOTAL		3837.68

CROP EXPENSES CONTINUED

CORNSTALKS HARVESTED

FUEL,OIL,REPAIRS	95.23	
MACHINE HIRE	152.12	
INTEREST	8.66	
SUBTOTAL		256.01

LIVESTOCK EXPENSES

COW-CALF 139.74 HEAD

SALT AND MINERAL	1117.90	
VET AND MEDICAL	978.16	
POWER AND FUEL	698.69	
OTHER VARIABLE COSTS	628.82	
INTEREST	239.65	
SUBTOTAL		3663.21

BULLS 5.59 HEAD

SALT AND MINERAL	44.72	
VET AND MEDICAL	16.77	
POWER AND FUEL	22.36	
OTHER VARIABLE COSTS	25.15	
INTEREST	7.63	
SUBTOTAL		116.62

REPLACEMENTS 18.01 HEAD

SALT AND MINERAL	144.06	
VET AND MEDICAL	108.04	
POWER AND FUEL	58.52	
OTHER VARIABLE COSTS	63.03	
INTEREST	26.16	
SUBTOTAL		399.81

INCOME STATEMENT

INCOME	
CORN	33657.66
GRAIN SORGHUM	0.00
SOYBEANS	0.00
OATS	6190.46
STRAW	2448.91
CULL COWS	4366.79
STEERS	10823.53
HEIFERS	6646.46
TOTAL	64133.81

EXPENSES	
FUEL,OIL,REPAIRS	4088.61
FERTILIZER	9427.18
HERBICIDE	1224.91
INSECTICIDE	524.96
SEED	2788.33
DRYING COSTS	372.00
MACHINE HIRE	152.12
OTHER VARIABLE COSTS	594.64
LIVESTOCK EXPENSES	3906.21
HIRED LABOR	1239.70
REPLACEMENTS	-0.00
FEEDING COSTS	325.09
INTEREST	1006.89
TOTAL	25650.65

RETURN OVER VARIABLE COST	38483.16
FIXED LAND CHARGE	12500.00
FIXED LABOR	8000.00
FIXED CROP	10220.00
FIXED LIVESTOCK	4450.76
RETURN TO MANAGEMENT	3312.40

LABOR SUMMARY

PERIOD	FIXED LABOR UTILIZED	TOTAL FIXED LABOR SUPPLY	HOURLY HIRED LABOR [1]	RETURN [2]
JANUARY	84.71	212.57	0.00	-0.00
FEBRUARY	113.60	192.00	0.00	-0.00
MARCH 1-15	64.20	115.71	0.00	-0.00
MARCH 16-31	123.43	123.43	0.00	0.22
APRIL 1-15	128.57	128.57	128.57	2.50
APRIL 16-30	128.57	128.57	38.14	2.50
MAY 1-15	109.89	154.29	0.00	-0.00
MAY 16-31	47.84	164.57	0.00	-0.00
JUNE 1-15	154.29	154.29	37.95	2.50
JUNE 16-30	53.92	154.29	0.00	-0.00
JULY	318.86	318.86	7.58	2.50
AUGUST	64.06	239.14	0.00	-0.00
SEPTEMBER 1-15	19.96	128.57	0.00	-0.00
SEPTEMBER 16-30	19.96	128.57	0.00	-0.00
OCTOBER 1-15	22.26	128.57	0.00	-0.00
OCTOBER 16-31	137.14	137.14	0.00	0.54
NOVEMBER 1-15	126.82	128.57	0.00	-0.00
NOVEMBER 16-30	17.78	128.57	0.00	-0.00
DECEMBER	173.10	257.14	0.00	-0.00
TOTAL	1908.97	3123.43	212.24	

1/ HOURLY HIRED LABOR DOES NOT INCLUDE HOURLY LABOR HIRED BECAUSE JOB REQUIRES MORE THAN ONE MAN
2/ THE RETURN FIGURE REPRESENTS THE NUMBER OF DOLLARS THE LAST HOUR CONTRIBUTED TO NET INCOME

FORAGES IN THE PLAN

	ACRES	PENALTY 1/
ORCHARDGRASS 120N		
CONTINUOUS GRAZE	0.00	14.96
3-SEASON	0.00	17.95
3-SEASON EARLY	0.00	21.84
HARVEST 2 CROPS	0.00	21.81
ORCHARDGRASS 240N		
3-SEASON EARLY	24.44	-0.00
HARVEST 1 CROP	0.00	3.39
HARVEST 2 CROPS	0.00	-0.00
ALFALFA-GRASS		
ROTATIONAL GRAZE	0.00	7.76
HARVEST 1 CROP	0.00	3.71
HARVEST 2 CROPS	0.00	11.27
HARVEST 2 CROPS STOCKPILE	64.36	-0.00
HARVEST 3 CROPS	30.95	-0.00
ROUND BALE GRAZING OCT.		
ALFALFA-GRASS	0.00	14.54
SMOOTH BROME 120N	0.00	33.93
ORCHARDGRASS 120N	0.00	37.47
REED CANARYGRASS 120N	0.00	27.31
TALL FESCUE 240N	0.00	14.04
REED CANARYGRASS 240N	0.00	19.37
SMOOTH BROME 240N	0.00	16.60
ORCHARDGRASS 240N	0.00	13.86
BIRDSFOOT TREFOIL	0.00	22.69
BIRDSFOOT TREFOIL C	0.00	21.34
LARGE ROUND BALE GRAZING OCT.		
ALFALFA-GRASS	0.00	11.93
SMOOTH BROME 120N	0.00	30.42
ORCHARDGRASS 120N	0.00	33.08
REED CANARYGRASS 120N	0.00	22.74
TALL FESCUE 240N	0.00	10.71
REED CANARYGRASS 240N	0.00	16.54
SMOOTH BROME 240N	0.00	13.37
ORCHARDGRASS 240N	0.00	11.00
BIRDSFOOT TREFOIL	0.00	19.68
BIRDSFOOT TREFOIL C	0.00	19.68
BIRDSFOOT TREFOIL C		
CONTINUOUS GRAZE	62.44	-0.00
STOCKPILE 1	0.00	0.86
STOCKPILE 2	5.74	-0.00
HARVEST 1 CROP	0.00	15.85

	ACRES	PENALTY 1/
SMOOTH BROME 120N		
CONTINUOUS GRAZE	0.00	14.77
3-SEASON	0.00	18.40
3-SEASON EARLY	0.00	21.83
HARVEST 2 CROPS	0.00	17.79
SMOOTH BROME 240N		
3-SEASON EARLY	0.00	3.25
HARVEST 1 CROP	0.00	5.84
HARVEST 2 CROPS	0.00	-0.00
TALL FESCUE 240N		
3-SEASON	0.00	2.53
HARVEST 1 CROP	0.00	2.23
HARVEST 2 CROPS	0.00	-0.00
SWITCHGRASS 60N		
CONTINUOUS GRAZE	0.00	18.48
ROUND BALE GRAZING NOV.		
ALFALFA-GRASS	0.00	13.30
SMOOTH BROME 120N	0.00	32.05
ORCHARDGRASS 120N	0.00	35.42
REED CANARYGRASS 120N	0.00	25.19
TALL FESCUE 240N	0.00	11.37
REED CANARYGRASS 240N	0.00	16.56
SMOOTH BROME 240N	0.00	14.14
ORCHARDGRASS 240N	0.00	11.36
BIRDSFOOT TREFOIL	0.00	21.16
BIRDSFOOT TREFOIL C	0.00	19.81
LARGE ROUND BALE GRAZING NOV.		
ALFALFA-GRASS	0.00	10.52
SMOOTH BROME 120N	0.00	28.31
ORCHARDGRASS 120N	0.00	30.74
REED CANARYGRASS 120N	0.00	20.31
TALL FESCUE 240N	0.00	7.82
REED CANARYGRASS 240N	0.00	13.54
SMOOTH BROME 240N	0.00	10.69
ORCHARDGRASS 240N	0.00	8.31
BIRDSFOOT TREFOIL	0.00	17.91
BIRDSFOOT TREFOIL C	0.00	17.91
KENTUCKY BLUEGRASS 60N		
CONTINUOUS GRAZE	0.00	9.66
3-SEASON	0.00	3.09

	ACRES	PENALTY 1/
BIRDSFOOT TREFOIL		
CONTINUOUS GRAZE	0.00	-0.00
STOCKPILE 1	0.00	0.86
STOCKPILE 2	33.34	-0.00
HARVEST 1 CROP	0.00	15.85
REED CANARYGRASS 240N		
3-SEASON	0.00	7.94
3-SEASON EARLY	0.00	2.01
HARVEST 1 CROP	0.00	8.18
HARVEST 2 CROPS	0.00	7.80
CROWNVETCH		
CONTINUOUS GRAZE	0.00	2.64
KENTUCKY BLUEGRASS		
CONTINUOUS GRAZE	0.00	13.23
ROUND BALE GRAZING DEC.		
ALFALFA-GRASS	0.00	11.62
SMOOTH BROME 120N	0.00	29.52
ORCHARDGRASS 120N	0.00	32.66
REED CANARYGRASS 120N	0.00	22.32
TALL FESCUE 240N	0.00	7.76
REED CANARYGRASS 240N	0.00	12.75
SMOOTH BROME 240N	0.00	10.81
ORCHARDGRASS 240N	0.00	7.98
BIRDSFOOT TREFOIL	0.00	19.10
BIRDSFOOT TREFOIL C	0.00	17.75
LARGE ROUND BALE GRAZING DEC.		
ALFALFA-GRASS	0.00	8.61
SMOOTH BROME 120N	0.00	25.46
ORCHARDGRASS 120N	0.00	27.59
REED CANARYGRASS 120N	0.00	17.03
TALL FESCUE 240N	0.00	3.92
REED CANARYGRASS 240N	0.00	9.48
SMOOTH BROME 240N	0.00	7.07
ORCHARDGRASS 240N	0.00	4.67
BIRDSFOOT TREFOIL	0.00	15.52
BIRDSFOOT TREFOIL C	0.00	15.52
REED CANARYGRASS 120N		
CONTINUOUS GRAZE	0.00	13.77
HARVEST 1 CROP	0.00	27.31

1/ THE PENALTY REFERS TO HOW MUCH NET INCOME WOULD BE REDUCED IF ONE ACRE OF THIS FORAGE WAS INCLUDED IN THE PLAN

FORAGES IN THE PLAN CONTINUED

SUPPLEMENTAL PASTURES CLASS A			SUPPLEMENTAL PASTURES CLASS B		
SORGHUM SUDAN ALT. GR.	0.00	-0.00	SORGHUM SUDAN ALT. GR.	0.00	-0.00
SORGHUM SUDAN STOCKPILE	0.00	19.45	SORGHUM SUDAN STOCKPILE	0.00	18.17
FORAGE SORGHUM STOCKPILE	0.00	94.13	FORAGE SORGHUM STOCKPILE	0.00	89.40
FORAGE SORGHUM STUBBLE	0.00	-0.00	FORAGE SORGHUM STUBBLE	0.00	-0.00
CORNSTALKS HARVESTED	0.00	----	CORNSTALKS HARVESTED	124.99	----
CORNSTALKS GRAZED			CORNSTALKS GRAZED		
OCTOBER	0.00	----	OCTOBER	0.00	----
NOVEMBER	50.00	----	NOVEMBER	80.04	----
DECEMBER	50.00	----	DECEMBER	124.99	----
JANUARY	50.00	----	JANUARY	124.99	----
GRAIN SORGHUM STUBBLE GRAZED			GRAIN SORGHUM STUBBLE GRAZED		
OCTOBER	0.00	----	OCTOBER	0.00	----
NOVEMBER	0.00	----	NOVEMBER	0.00	----
DECEMBER	0.00	----	DECEMBER	0.00	----
JANUARY	0.00	----	JANUARY	0.00	----
FEBRUARY	0.00	----	FEBRUARY	0.00	----

NUTRIENT REQUIREMENTS

TOTAL DIGESTIBLE NUTRIENTS

MONTH	REQUIRED	EXCESS	RETURN 1/
JANUARY	50918.46	0.00	0.03088
FEBRUARY	42127.44	0.00	0.03088
MARCH	62274.32	0.00	0.03103
APRIL	58186.34	0.00	0.03453
MAY	72171.63	0.00	0.03088
JUNE	65785.80	0.00	0.01818
JULY	72148.20	0.00	0.03453
AUGUST	73929.68	0.00	0.00053
SEPTEMBER	73320.65	0.00	0.02566
OCTOBER	43374.66	36729.33	-0.00000
NOVEMBER	42420.08	0.00	0.02129
DECEMBER	44501.89	0.00	0.03088
DIGESTIBLE PROTEIN			
JANUARY	9542.37	3439.61	-0.00000
FEBRUARY	9422.39	5874.75	-0.00000
MARCH	12034.36	0.00	0.00006
APRIL	12247.81	6493.06	-0.00000
MAY	12958.53	6461.63	-0.00000
JUNE	12952.25	6421.36	-0.00000
JULY	13530.19	7885.83	-0.00000
AUGUST	13546.43	8238.11	-0.00000
SEPTEMBER	17085.06	9701.88	-0.00000
OCTOBER	10337.46	14095.89	-0.00000
NOVEMBER	13652.48	2010.77	-0.00000
DECEMBER	10686.06	1011.20	-0.00000

1/ THE RETURN FIGURE REPRESENTS HOW MUCH THE LAST POUND OF TON OF DIGESTIBLE PROTEIN CONTRIBUTED TO NET INCOME

STORED ROUGHAGE FED (TON/MONTH)

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
ALFALFA-GRASS	43.56	62.18	28.73	74.78	19.37	0.00	11.56	0.00	0.00	0.00	0.00	15.99
BIRDSFOOT TR.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ORCHARDGRASS	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SMOOTH BROME	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
REED CANARY.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TALL FESCUE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OAT HAY	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STRAW	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORN SILAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OAT SILAGE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FOR. SOR. SIL.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CORNSTALKS-FLAIL	0.00	0.00	80.31	----	----	----	----	----	----	----	0.00	1.78
CORNSTALKS-SH.	0.00	0.00	30.42	----	----	----	----	----	----	----	----	0.00